THE IRON AGE

New York, August 8, 1929

ESTABLISHED 1855 VOL. 124, No. 6

Apprentices Trained Four Years

Worthington Company Program Includes Both Practical Training and Class Room Work—Junior Student Engineers' Course Also Conducted

BY JOHN F. BIEHL*

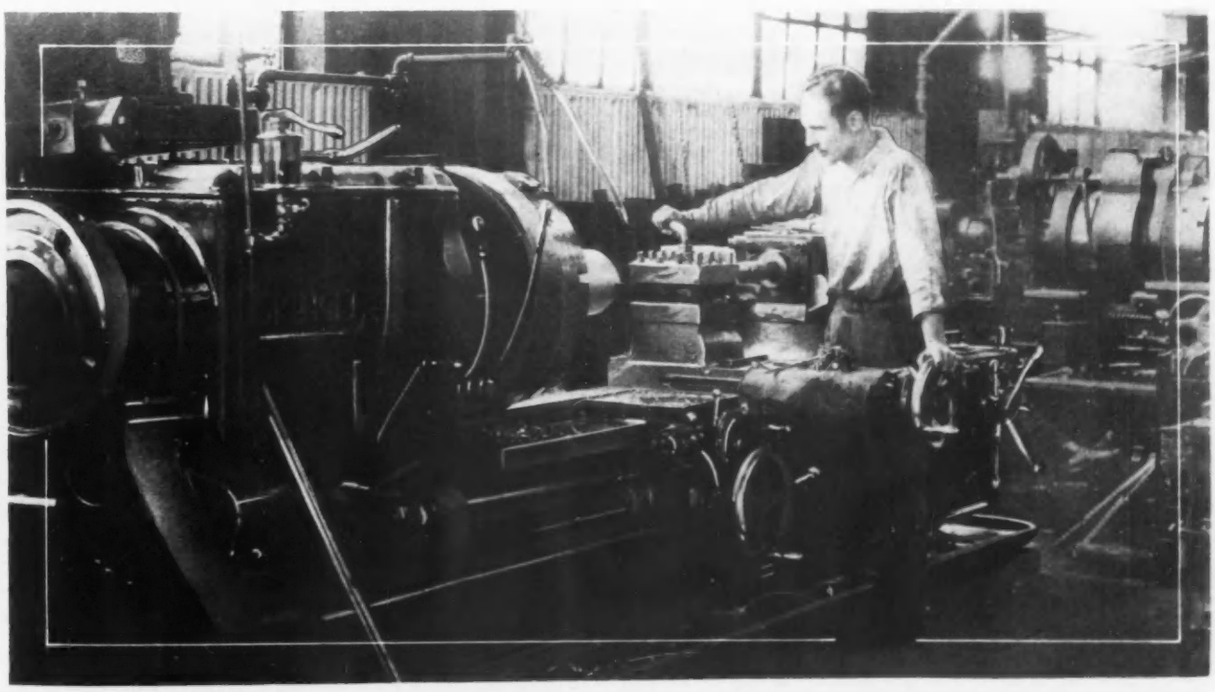
IN September, 1920, our plant put into operation a training program for pattern and machinist apprentices which had been approved by a committee consisting of the works manager, department superintendent, production superintendent and several interested foremen. Since that time the committee has held periodic meetings to revise the program to provide for expansion of training activities along lines not originally contemplated.

All machinist apprentices are under the direct supervision of an instructor whose duties are to teach them how to operate machine tools, to submit weekly apprentice reports to the educational director, and to cooperate with department foremen in obtaining the most satisfactory results. Incidentally, foremen are not expected to spend their time with beginners.

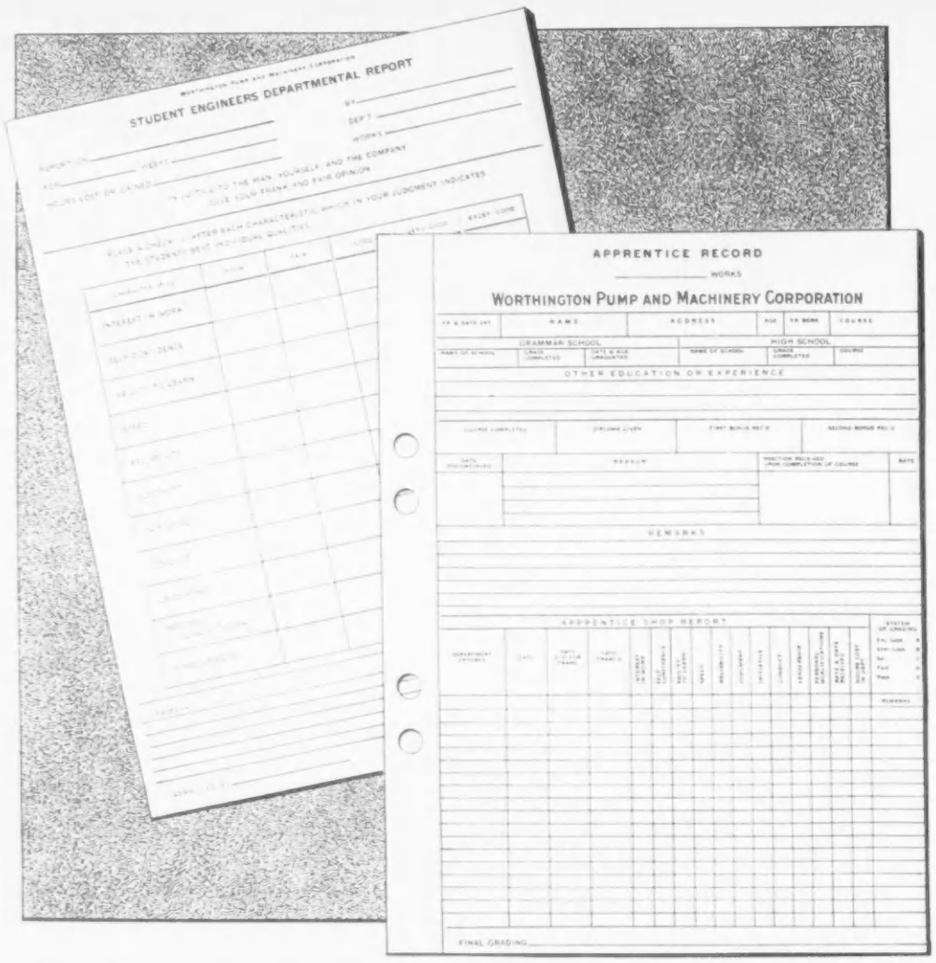
The present training program for machinist apprentices covers four years, or a total of 9984 working hours. Details of the program are given on another page and divided as shown.

Jig and tool apprentices are selected from boys who have had experience up to the tool grinding period, although occasionally one who has progressed further is chosen. Rates are the same as those for machine apprentices. Pattern shop apprentices are given foundry training during the first six months and during the next three and one-half years work in the pattern shop under the direct supervision of the department superintendent, who, from time to time, calls upon the educational director for

*Laidlaw Works, Worthington Pump & Machinery Corporation, Elmwood Place, Ohio.



Machinist Apprentices Receive Practical Training in Operating Machine Tools During Four-Year Course



Records of Apprentices and of Junior Student Engineers Are Kept on Forms Shown Above

assistance. There is only a slight difference in rates as compared with those for machinist apprentices.

In addition to the practical training already outlined, machine apprentices receive "related training," which is based on a program formulated by the Ohio State Department of Vocational Education and by the company. It consists of:

First Year.—Review of general school arithmetic presented in the form of shop mathematics, pertaining to decimal equivalents, etc.; blue print reading and study of machine tools; practical application of calipers, micrometers, etc. Classes are conducted twice each week from September to June.

Second Year.—Mechanical drawing 2 hr. a night once a week. Algebra first half of term and geometry the latter half, with practical applications; instruction 1 hr. twice a week from September to June.

Third Year.—Study of steam engines and compressors 1½ hr. once a week. Trigonometry first half of term and strength of materials latter half; 1 hr. twice a week from September to October.

Training Program for Machinist Apprentices

Type of Work	Length of Time	Period of Training	Rate per Hour
Errand and helper	Probationary	1	25c.
Tool or jig counter	3 months	2	27c.
Drill operation	3 months	..	....
Tool grinding	3 months	3	29c.
Shaper and miller	6 months	4	31c.
Small lathe	6 months	5	33c.
Large lathe	6 months	6	35c.
Horizontal or vertical boring mill	6 months	7	37c.
Unit assembly	3 months	..	....
Layoff work	6 months	8	39½c.
Erection	6 months	9	42c.
Total	4 years		

Fourth Year.— Practical applications of mechanism first half of term and mechanics second half, 1 hr. twice a week; jig and tool design (drafting, etc.) 1½ hr. once a week; short course in business English and industrial economics given at most convenient time during year.

Pattern shop apprentices receive instruction in all of the above subjects except jig and tool design.

On account of the location of the plant outside the corporate limits of Cincinnati and the inability of the Elmwood Place, Ohio, public schools to pay nonresident tuition in the Cincinnati schools, the company has been compelled to operate its own related training department. The results have proved satisfactory, the outstanding advantage to the company having been the possibility of determining at close range the apprentice's ability to fill future positions, as well as judging his immediate work.

Related training is carried on after regular work hours. All instructors are employees occupying responsible positions with the company, but are certified by the State Department of Education. They receive compensation for their services as instructors, one-half of their salary being paid by the company and one-half by the State. They meet monthly with the educational director to discuss the work the apprentices are doing.

The program outlined in 1920 called for 16 machinist apprentices, four to graduate each year. However, the results have been so successful that the number has been increased from 16 to 24, or six graduates each year. The present allotment of apprentices is as follows:

Seven helpers and errand boys (beginners)
One tool counter assistant
Two tool grinders (over 18 years of age)
Two drill operators
One small lathe operator
One large lathe operator
Two vertical boring mill operators
One horizontal boring mill operator
One cylindrical grinder operator (generally not included in course)
One shaper, milling machine and planer operator (usually one on milling machine and one on planer)
One assembler
One tool apprentice
One jig apprentice
One special draftsman
One turret lathe operator

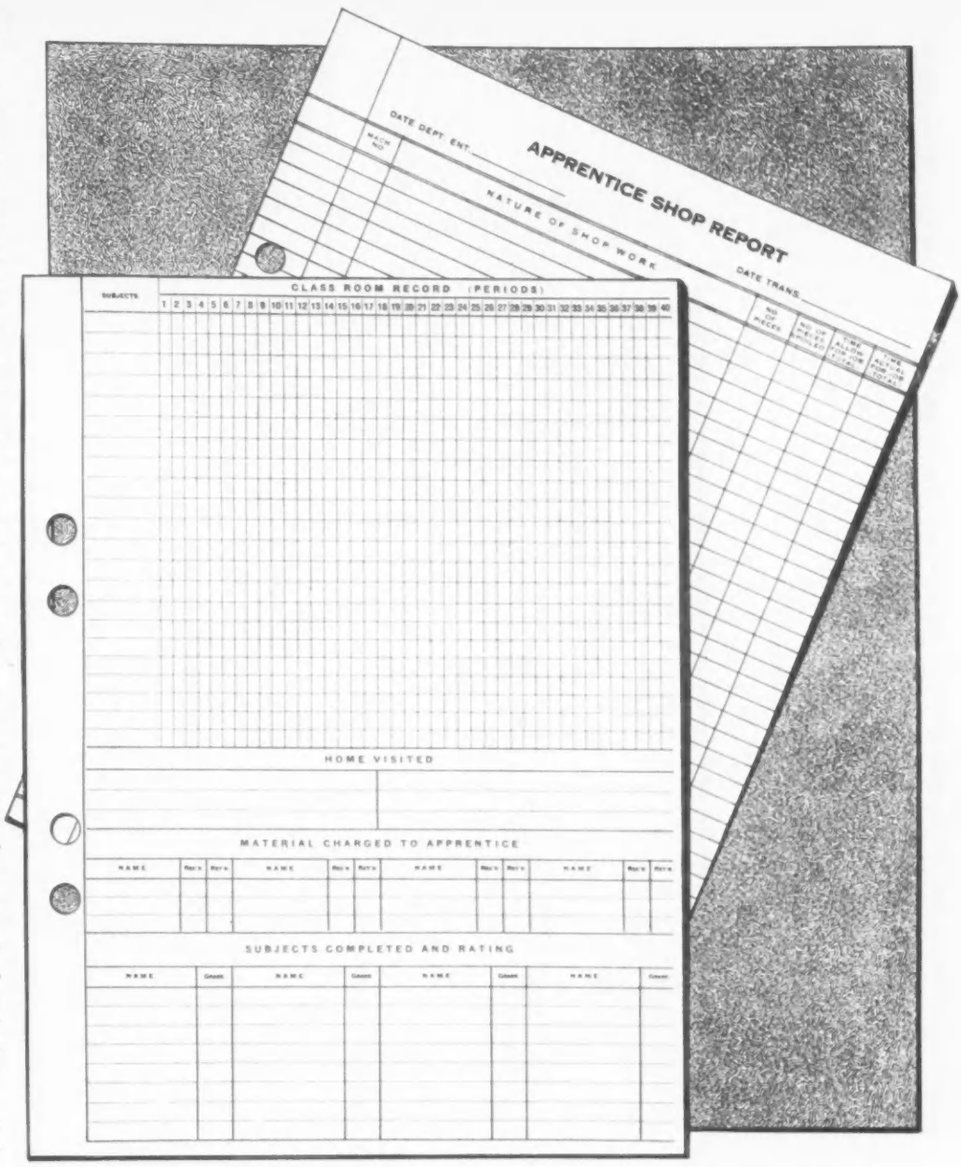
The quota of machinist apprentices was arrived at by (a) making a survey of the machines that apprentices could operate within the child labor laws; (b) by considering the number of department employees and of machine shop mechanics; (c) by studying the possibility of utilizing services of apprentices in slack periods to insure carrying out the company's policy of continuous employment throughout the four years of apprenticeship. These factors also were considered in establishing the quota of pat-

tern apprentices.

The present ratio of machinists to apprentices is approximately 10 to 1. In the pattern shop four apprentices constitute a full quota, one apprentice completing his training period each year. The ratio of pattern makers to apprentices is about 5 to 1.

Forms used in connection with apprenticeship training have been confined to a school and shop record, related training record, foreman's conclusion regarding the apprentice at the close of the training period and a personal weekly apprentice report. While the first three are important, the most valuable is the personal weekly apprentice report, which sets forth the work done by the apprentice during the week—amount of repetitional work, number of pieces spoiled, time allowed on job and time in which job was actually completed. For apprentices not working on machine tools, the report acts as a safeguard against incomplete training.

Inasmuch as the report is used primarily to judge the apprentice's work and ability, it also affords a check of the shop instructor's efforts. His efficiency is reflected in the data pertaining to spoiled work and in the time in which the jobs were actually completed.



The Shop and Class Room Standing of Each Apprentice Is Rated on Cards (Above), Which Are Kept on File

Each week the accounting department supplies the educational director all work tickets of machinist apprentices. These are checked and the total hours lost or gained by each apprentice are noted. A summary of the total loss or gain of all machinist apprentices is prepared, and a copy is forwarded to the instructor to inform him of apprentices in need of further instruction.

Subsequent History of Machinist Apprentices

The record of machinist apprenticeship training since 1920 is shown in a table. The 18 graduates of the course still in the company's employ are as follows: one milling machine operator, one lay-off worker, one machine repairer, one vertical boring mill and general utility operator, two lathe operators, two vise hands, one lathe department inspector, one road man, one radial drill department inspector, one vertical drill department inspector, one jig and tool designer, one erector, one horizontal boring machine operator, two jig makers and one tool maker.

Expressed in percentages, graduates of the machinist apprenticeship course have filled positions as given in the following classification:

	Per Cent
Machine tool operators	27.80
Inspectors	16.66
Draftsmen	5.55
Vise hands	33.33
Jig makers	11.11
Tool makers	5.55

In 1924 the apprenticeship training program was supplemented by a junior student engineers' course, which is confined to high school graduates technically inclined and to young men who have been compelled, on account of conditions beyond their control, to discontinue their technical training at college. The object of the course is to develop men for positions beyond the ability of the apprentice, such as sales, engineering and road work.

Practical training provided in this course consists of foundry practice; operation of drill presses, lathes, boring mills and milling machines; lay off; unit assembly; hydraulic testing; erection of medium and small compressors; and experimental engineering. The period for each of these tasks ranges from two to six months. To round out his experience the student selects the type of work he desires, such as sales, erection or engineering, for an in-

Foundry Practice Is Stressed in Course for Foundry Apprentices

tensive training period of nine months. His rate of pay graduates from 32c. an hour during the first six months' period to 50c. during the eighth and final period.

Junior students are put through a related training course in the following subjects:

Analytical geometry
Strength of materials
Mechanical drawing
Use of slide rule
Calculus
Business English
Elements of steam engineering
Mechanics
Thermodynamics
Industrial economics
Advanced engineering drawing
Study of compressors
Departmental student conferences
Principles of factory management
Applied electricity (at local technical school)

Foundry apprenticeship training was put into operation in June, 1927. The practical and related training is of such nature as to attract men whose services can be utilized in other work besides molding and core making, if necessary. During the first three years of this program the apprentice is instructed in making small and large cores, core finishing, bench molding, side floor molding, main floor molding and cupola practice. The last year he is permitted to select either molding or core making. He starts his training period at 37c. an hour and at the end of the fourth year is receiving 60c. Related training embodies blue print reading and sketching, monthly meetings with department heads, algebra, geometry, physics, chemistry, strength of materials, metallography, industrial economics, foremanship and factory management. Foundry practice is emphasized throughout the entire course.

When all training programs of the company are operating according to their respective quotas in 1930, there will be 60 young men in training, divided as follows: machinist apprentices, 40 per cent; pattern apprentices, 7 per cent; junior students, 27 per cent; foundry apprentices, 26 per cent.

No Difficulty in Getting Recruits for Courses

Previous to 1923 difficulty was experienced in getting applications for apprenticeship courses, largely because both parents and boys were primarily interested in wages instead of training for future employment. However, the favorable publicity given the program by the employees and by the apprentices themselves regarding its benefits and the opportunities at the expiration of the apprenticeship period resulted in employees getting their own sons and close friends to take advantage of the training courses. While some applicants are secured through efforts of outside organizations, the greatest source of supply has been the vocational department of the Cincinnati public schools.

All changes of rates and transfers are made by the educational director and are forwarded to the department superintendent for approval. In accordance with the agreement entered into by the apprentice and the company in regard to the training program, prompt transfers and changes of rates are made, unless some unusual condition arises which makes desirable the temporary postponement of changes. There are times, for instance, when rush orders or lack of sufficient help make it advisable to retain an apprentice beyond the allotted period. This is never done without explaining to him the reasons and without setting, if possible, a definite date when he will be transferred. To avoid impairment of production, foremen are notified by the instructor at least one week in advance of changes and of the new boys they will receive.

The use of nickel as such does not eliminate internal shrinkage in castings, according to the experience of R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Corporation, Boston. He was incorrectly reported in this particular in THE IRON AGE of July 4 in the report of the International Foundry Congress in London. The latter part of the report of Mr. Harrington's discussion is correct, namely, that he has a high regard for nickel in respect to its ability to permit of a more uniform structure in the various sections of castings having light and heavy sections.

Machinist Apprentices, 1920-1929

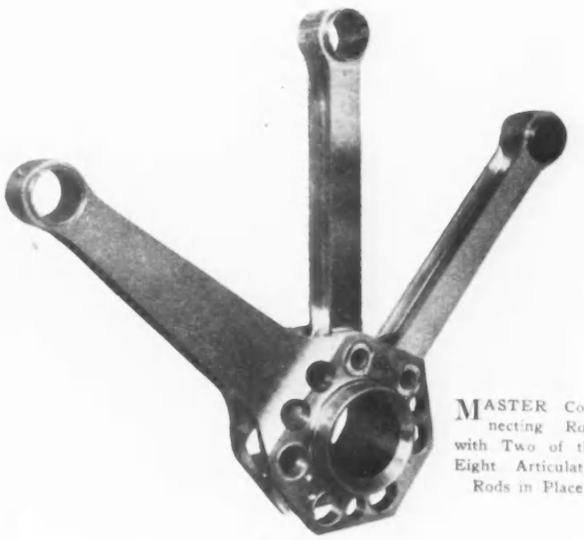
Year	Total Employed	Number Departed Before Agreement Signed	Number Departed After Agreement Signed	Total Finished or Still Training	Per Cent Completed Course or Still Training	Graduates Still in Employ	Who Left Employ
1920	4	..	..	4	100.00	4	..
1921	10	6	1	3	30.00	3	..
1922	11	9	..	2	18.00	2	..
1923	13	7	3	3	23.10	2	1
1924	12	5	2	5	41.66	5	..
1925	10	4	4	2	20.00	2	..
1926	14	8	1	5	35.71	(In training)	..
1927	9	3	1	5	55.55	(In training)	..
1928	11	5	1	5	45.45	(In training)	..
1929	10	1	..	9	90.00	(In training)	..
Total	104	48	13	43		18	

Note: Three graduates left the company's employ after graduation, but two have returned.

Machining Two Connecting Rods

Forgings for Master and Articulated Rods Pass Through Boring, Reaming, Milling, Drilling, Facing and Grinding Operations

BY FAY LEONE FAUROTE*



MASTER Connecting Rod, with Two of the Eight Articulated Rods in Place

UPON receipt of the forgings for the master connecting rod, they are inspected and corresponding numbers are stamped on the rod and test piece, which is cut off close to the hub. These test pieces are held by the inspection department until the heat-treating department notifies the inspectors that the rods are to be heat treated. The forgings are then annealed if necessary.

Next they are put in a three-jaw chuck. After facing, a 1½-in. drill is put through, followed by a 2⅜-in. drill, then a 2 15/32-in. boring bar, which is followed by a 2½-in. reamer. The flange is then rough faced to 1¼ in. from center of rod and turned to 3.156-in. diameter hub. The hub is rough faced to 3/16 in. from finished face, after which the rod is put in a 24-in. Bullard, where two operations are performed: First, the flange is rough faced to 2½ in. and turned to 3.156 ± 0.005 in. diameter. The hub is also rough faced from finished face to 19/32 in. or 3 9/32 ± 0.005 in. overall.

A 1 7/32 in. hole is then drilled through the wrist pin hub. It is then reamed to 1.250 ± 0.001 in. diameter.

For the rough milling operation the part is then put in a Cincinnati Hydromatic miller, two rods at a time clamped in a fixture. This operation rough mills the side of the channel, making 13/16 in. dimension at wrist pin boss to ⅞ in., holding 3 5/32 in. dimension at large end to 3 7/32 in. The rods are then reversed and the operation is repeated.

Then the five sides of the cheeks are rough milled on a Sundstrand Rigidmil, making 2.700 in. dimension to 2 49/64 in. The rough milling of the edges of the channel and the side of the cheek, making 2.700 in. dimension to 2 49/64 in. and allowing 1/16 in. for finish on the edges of the channel, are performed on two rods at a time on a Hydromatic miller; as is also the operation of rough milling to 1¼ in. wide, holding depth ⅛ in. from center. Parts are reversed and the operation repeated, making a web thickness of ¼ in.

A vertical miller is used to rough mill the wrist pin boss, making 0.828 in. radius to 57/64 in. radius. After the edges are smoothed with a file, the master connecting rod is heat treated so that it will register a Brinell hardness of 302 to 320, after which it is sand-blasted, pickled, neutralized in a lime solution and blown off with live steam.

After inspection for cracks, seams and other defects, it is placed in a fixture and the crankpin hole is finish-bored to 2.700 in. diameter. The side of the cheek is then finish-faced 2 7/16 in. from the other face or 1 3/16 in. from the center. It is then finish-turned to 3 1/32 in. diameter, finish-faced 3 1/32 in. diameter boss to 3/16 ± 0.005 in. from face of cheek. Finally, it is finish-turned to 2 13/16 in. diameter, starting 11/16 in. from end X and making the cut 1⅜ in. wide. The inside is finish reamed to 2.726 ± 0.002 in. diameter.

Held on an expansion arbor, the cheek is finish-faced to 2⅜ in. overall. The rod is finish-turned to 3 1/32 in. diameter and the hub finish-faced to 3.172 ± 0.002 in. overall. The rod is then put on a drill press and the wrist pin hole is rough bored to 1.366 in. diameter, after which it is finish reamed to 1.381 ± 0.001 in. diameter.

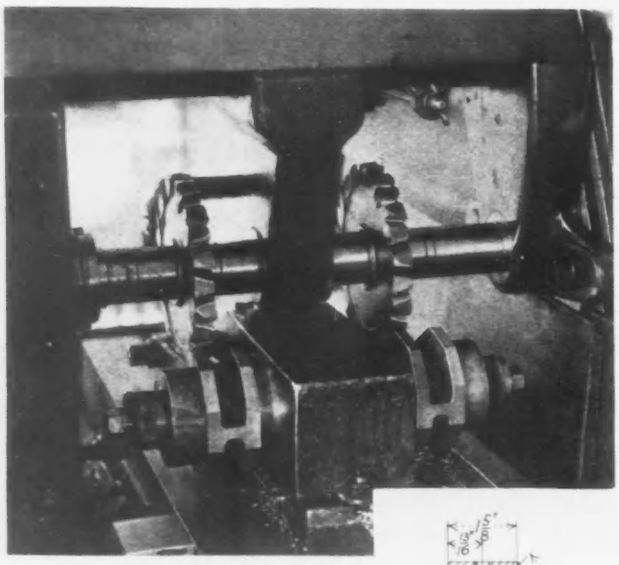
Both edges of the channel are then finish milled on a Hydromatic miller, two rods at a time, after which the channel itself is finish milled 1⅜ in. wide, depth 1/16 in. from center. The parts are then reversed and the operation repeated, making the web thickness ⅛ in. A vertical miller is employed to finish mill the wrist pin boss 1 21/32 ± 0.010 in. Two rods are loaded in a fixture on a Cincinnati Hydromatic miller and the side of the channel is finish milled to 13/16 in. from center. The rods are reversed and the operation repeated, making 1⅝ in. dimension at end of wrist-pin hub.

A Sundstrand Rigidmil finish mills the five sides of the cheeks to 2.700 ± 0.010 in. On a horizontal miller the master connecting rod is milled to 1⅝ in. radius at pin boss—depth 1/16 in. to center. The rod is then reversed and the operation repeated, holding the web at ⅛ in. thickness. A No. 3 standard Milwaukee vertical miller finish mills the center web 1⅜ in. wide to ⅝ in. dimension.

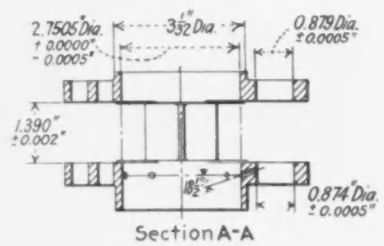
After disk grinding the five sides to remove tool marks, the corners of the cheeks are ground to a 3/16 in. radius. The part is then pickled for 5 min. in an alcohol solution containing 5 per cent nitric acid, neutralized and then inspected for cracks and flaws.

On a Bryant grinder the crankpin hole is rough ground to 2.745 ± 0.001 in. diameter, and the right face of the hub cleaned up to 0.187 ± 0.002 in. to cheek. The rod is then placed in a fixture and rough ground on an Abrasive

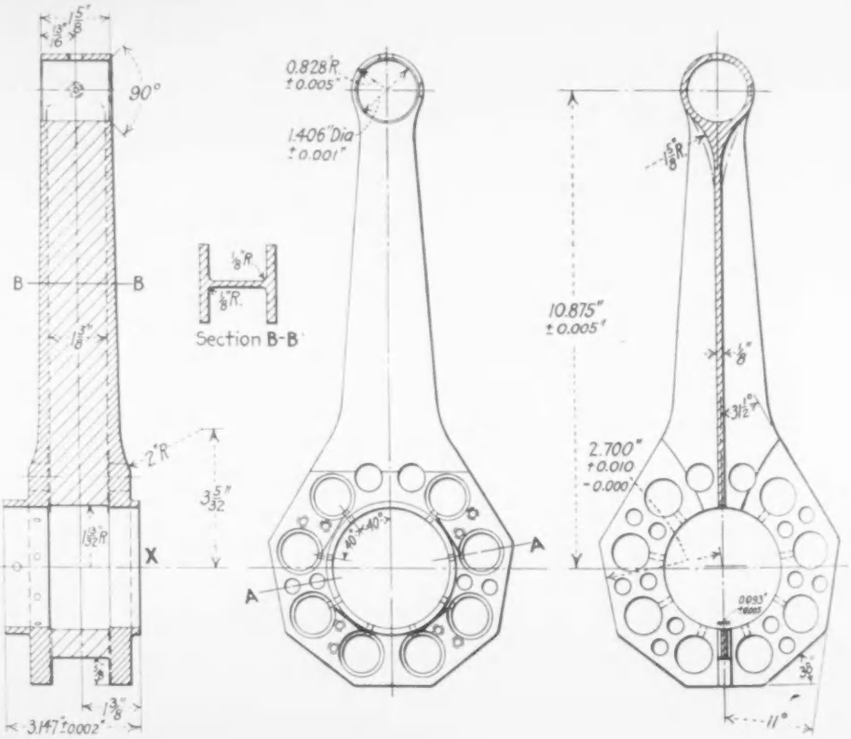
*Mechanical engineer, New York. This is one of a series of articles describing the machining of the chief parts of the new Wright Whirlwind aeronautical engine. The first article appeared in THE IRON AGE of July 18, page 148.

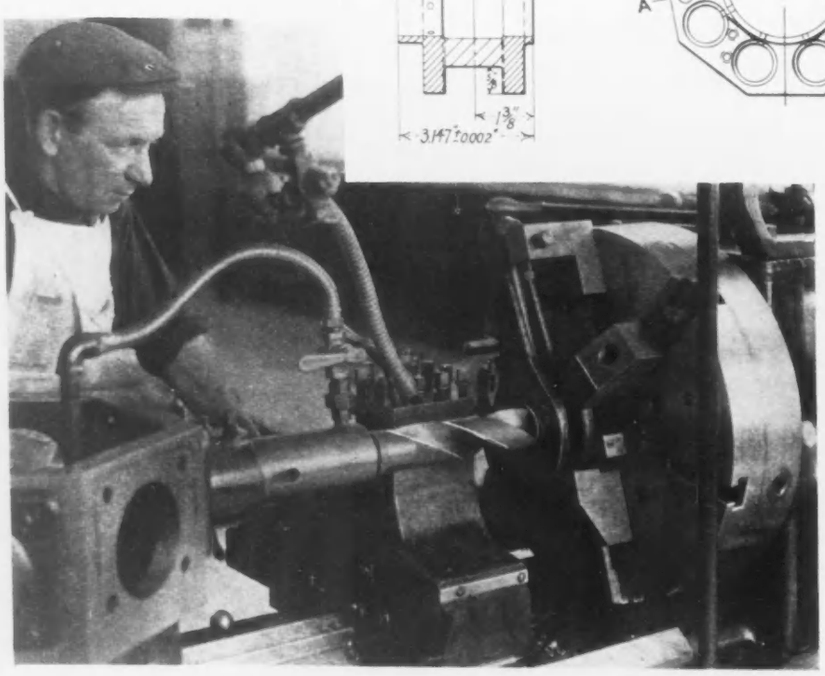


ROUGH Milling Channel on Two Master Rods on High-Powered Hydromatic Milling Machine (at Left)



THE Accompanying Drawings Cover the Master Connecting Rod with Which Are Articulated Eight Auxiliary Rods, of Which the Size and Design Are Shown on the Facing Page

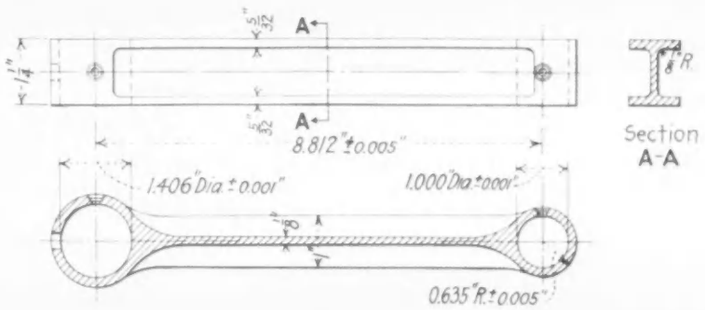




DRILLING and Rough Boring of Crankpin Hole and Facing Flange on Master Rod (at Left)

ABOVE: Checking Master Rod for Crankpin Alinement and Square with Wristpin Hole on Nine Cylinder Whirlwind. On the right are three Cyclone master rods

BELOW: Inspection of I-Beam Section Articulated Rod and Checking Knuckle Pin and Piston Pin Holes for Alinement



grinder to 1⅜ in. dimension (centerline to right face of hub). A bench operation forms a 3/32-in. radius and removes shoulder in channel on both sides. The rod is then polished all over.

A Blanchard surface grinder is used for grinding the face of the long hub to 3.147 ± 0.002 in. dimension. A four-spindle drill drills two 39/64 in. holes and reams them to ⅝ in. diameter. The jig is then turned over and the operation is repeated.

Drilling of the eight knuckle-pin holes is accomplished on a 16-spindle head Foote-Burt drill, boring 0.874 in. holes to 0.869 ± 0.001 in. diameter and 0.879 in. holes to 0.874 ± 0.001 in. diameter. A Leland-Gifford drill is used for counterboring eight 17/32-in. radius holes one side only (0.875 in. diameter holes) to 0.005 in. maximum depth (on short-hub side). The eight knuckle-pin holes are then rough reamed to 0.873 in. and 0.878 in. diameter, and finish reamed to 0.874 ± 0.0005 in. diameter and 0.879 ± 0.0005 in. diameter, being sure that the 0.879 in. diameter holes are on the counterbored side.

Using a Milwaukee No. 2 vertical miller, the flats are milled, blending out with face of cheek to 1.540 and 1.518 in. dimension. This is repeated four times by indexing. With a Leland-Gifford four-spindle drill twelve ⅜-in. holes are drilled through one side. Then the jig is turned over and four ⅜-in. holes are drilled through and eight No. 3 (0.213-in. diameter) holes are drilled through one side (¼-in. 28 P. tapped holes). Using a four-spindle Leland-Gifford drill press, eight ¼-in.—28 U. S. standard thread holes are tapped and eight ¼-in. tapped holes 1/32 in. x 45 deg. are countersunk.

Then a 1.406-in. hole 1/64 in. x 45 deg. is countersunk for the wristpin; the part is reversed and the operation repeated. With a sensitive drill eight 5/32-in. diameter holes at 18½ deg. angle are drilled into the eight 0.874-in. diameter holes. The Leland-Gifford four-spindle sensitive drill is used to drill one No. 13 (0.185-in. diameter) hole through one side of the long hub.

With an Abrasive surface grinder the master connecting rod is rough ground to 1.390 in. dimension, after which the web at bottom of rod is ground to 3/64 in. from centerline x 1⅜ in. wide, holding 1/32 in. radii in corners. The rod is reversed and the operation repeated, making web 0.093 ± 0.005 in. thick. The next operation, with a Bryant chucking grinder, is to chuck short hub out and finish grind the 2.7505 — 0.0005 in. diameter crankpin hole to size. Also with a Bryant chucking grinder the wrist-pin hole is ground to 1.406 ± 0.001 in. diameter.

The rod is finish ground 1.390 ± 0.002 in. dimension between the cheeks, with an Abrasive grinder, holding cheeks equal thickness. The rod is reversed and the operation repeated. A 5/16-in. diameter hole is then drilled with a four-spindle Leland-Gifford sensitive drill in the wrist-pin hub and a No. 19 drill (0.166 in.) in side of hub. The latter is then counterbored 0.250 ± 0.002 in. diameter to 0.046 ± 0.003 in. dimension and 5/16 in. diameter to 1/32 in. deep.

The burrs at holes are now removed and sharp edges, 1/64 in., are broken to 1/32 in. The holes are inspected, as is the alinement of crank-pin and wristpin hole. Next the wristpin bushing is pressed into place with an air arbor press (the 5/16 in. and ¼ in. holes lining up). A No. 19 (0.166 in. diameter) hole is drilled through the wall of the bronze bushing with a Leland-Gifford sensitive drill.

Then the rod is taken to the bench, where dowel is driven in place, a hardened plug is inserted in the bush and the metal at bottom of 5/16-in. counterbore is staked in to hold dowel. Next the wrist-pin hole is finish bored and reamed with a drill press to 1.250 ± 0.001 in. diamter, the sharp edges are removed at the bench, the hole is inspected and its alinement with the crankpin hole is checked.

After the master connecting rod has been given a fine polish all over on a polishing jack, the connecting rod bearing is pressed into place with an arbor press (⅛-in. holes in rod and bearing should be approximately in line). A No. 14 (0.182-in. diameter hole is drilled with a Leland-Gifford sensitive drill ⅛ in. deep to point of drill in bearing. It is drilled through with a ⅛-in. diameter drill and redrilled with a No. 14 flat-end drill to square up bottom of hole x ⅛ in. deep. Finally, a dowel is driven into place, the rod is washed thoroughly in the gasoline tank, inspected and delivered to finished stores.

How Articulated Rod Is Machined

THIRTY-FIVE operations are necessary for the machining of the articulated rod. The forgings are purchased from outside vendors and upon delivery to rough stores are inspected, heat treated if necessary, and then put through the Brinell test for hardness.

Both sides are then rough-milled and one side surface ground. The pin holes are drilled and reamed, and after the channels are rough-milled the rods are pickled, limed and washed, after which they are inspected for seams, laps, cracks and other defects.

They are then ground on both sides, the edges and radius are milled, after which the channel is finished milled. They are then given a stamp and serial numbers.

The end radii are milled, the pin holes drilled and reamed, the three small holes drilled, and after burrs are removed they are pickled, neutralized, washed and inspected. They are then rough-polished, the holes are ground, the sides disk ground, and the rods then inspected for alinement.

After taking off the rough edges, the bushings are pressed in, holes are drilled for pins, pins put in, after which the two bushings are finish-bored and inspected. If necessary the bushings are again finish-bored, after which the articulated rods are buffed and polished all over, washed in kerosene, inspected and delivered to the finished stock room.

Modern Ship is One-Tenth Copper, Says Association

A modern 30,000-ton ship is about one-tenth copper, according to the Copper and Brass Research Association, 25 Broadway, New York, which has completed a survey of shipbuilding. The bronze propellers of such a ship may contain 53,500 lb. of copper, shaft sleeves 53,000 lb., main propelling machinery 200,000 lb., electrical gear and wiring, 3,000,000 lb., and even such inconspicuous installations as voice tubes, it is stated, may require 100,000 lb. of copper.

The Copper and Brass Research Association says that prospective building programs of the world's merchant marine and navies indicate the construction of 3,000,000 gross tons of shipping a year. The yearly increase in world tonnage should amount to 1,000,000 or more tons. An average of 1,000,000 tons or more is lost or broken up each year.

"The United States now finds itself possessed of about 10,000,000 tons of shipping, nearly 500 per cent more than in 1914," the survey says. "A great deal of this is war heritage and almost 3,000,000 tons is now idle. Eventually, it is believed, this idle tonnage will be scrapped as there is little possibility that it could be operated at a profit in competition with ocean bound trade. Of the remaining 7,000,000 tons much of it is obsolete and is losing money. For this reason it may be retired from service as time and circumstances may warrant."

Byers New Process for Wrought Iron*

Inventor Describes Fundamentals of Method Whereby Pilot Plant Produces 200 Tons of Wrought Iron Daily— Puddler Eliminated by Steel Plant Equipment

BY JAMES ASTON

WROUGHT iron manufacture of today is usually associated with hand puddling. The essential steps in the process are:

1. Melting down the charge of pig iron in a cupola.
2. Refining the metal to a low content of the several metalloids.
3. Disintegration of or "graining" the mass in the slag bath resulting from refining.
4. Balling up the metallic mass and thereby incorporating with it a portion of the slag.
5. Compacting the composite mass with ejection of surplus slag.

The operation requires skill and severe manual effort, with an accompaniment of small outputs and high costs of manufacture.

It is to be expected that human ingenuity has been requisitioned to increase output and minimize manual labor. Numerous so-called "mechanical puddling" processes have been devised, with a dominance of failures, but with a few attaining a commendable degree of success. In general, the methods have employed furnaces of a rotary or oscillatory type, with the focus of attention upon obtaining agitation of the charge in simulation of the manua effort of the puddler.

Any successful method to displace hand puddling in the production of wrought iron must maintain or improve upon the characteristics of product obtained in hand puddling; it must do this with increased unit masses and aggregate output; and it must decrease manufacturing costs to an extent proportional to the expected expansion of the market for the product. Failures have been in part due to inconsistencies in quality of material produced, in part to difficulties of maintenance of equipment, and in part to manufacturing costs which, in comparison with those of hand puddling, were not attractive to capital. Metallurgically, disintegration of the refined base metal to secure minute and uniform intermingling with the slag is the crux of the problem, and was the focus of attention in the development of the Byers new process.

JAMES ASTON, inventor of the Byers new process for making wrought iron, started his researches on the subject in 1915. Eleven years later, when the principal operations had been verified on a tonnage basis, he resigned from the staff of A. M. Byers Co. to become head of the Department of Mining and Metallurgical Engineering at the Carnegie Institute of Technology

Plant and Operation at Warren

Operation at the plant of A. M. Byers Co. began at Warren, Ohio, in July, 1927. After a few months on a moderate scale, in which there was an ironing out of some of the mechanical difficulties, production was put upon a regular and steadily increasing basis. Today, with some extensions of the original equipment, output is in excess of 200 gross tons per day, with operations on two-turn, six-day week program.

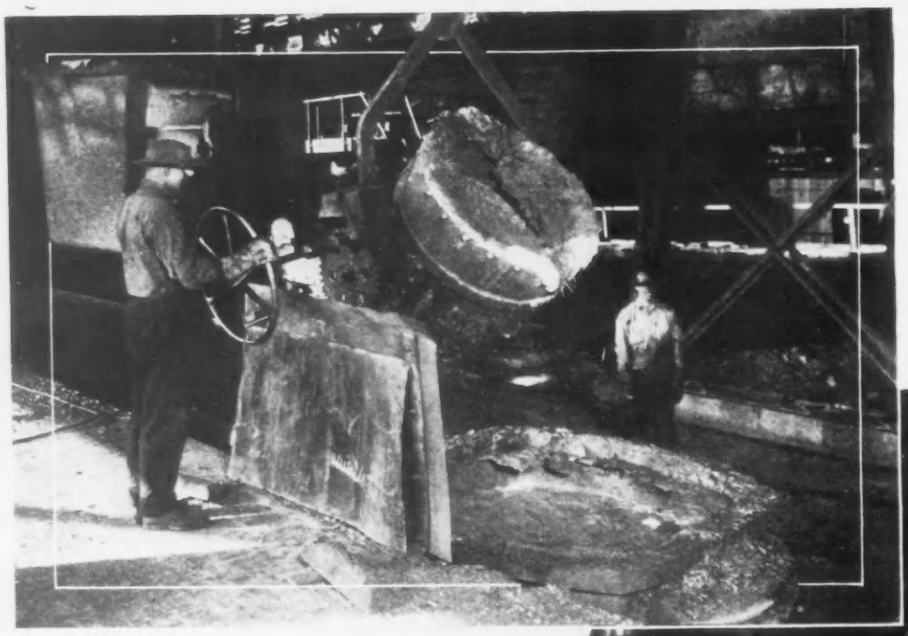
The process is divisible into several steps, which correspond to the above mentioned major subdivisions of the hand puddling method. The plant consists of several units, each of which is adapted to carry out its special phase of the operation.

Bessemer grade pig iron is melted in a 12-ft. cupola, similar to those used in supplying metal to Bessemer plants when direct blast-furnace metal is not available. It has a melting capacity of about 15 tons per hour, and operates continuously for a week, after which patching of the lining in the tuyere zone is necessary. The cupola is mechanically charged. There is a pickup of 4 to 5 points of sulphur; however, it is adequately eliminated by the use of about 20 lb. per ton of soda ash, added to the ladle on tapping. The full requirement for each heat is tapped at one time, then taken in a ladle to the converter house by an overhead crane.

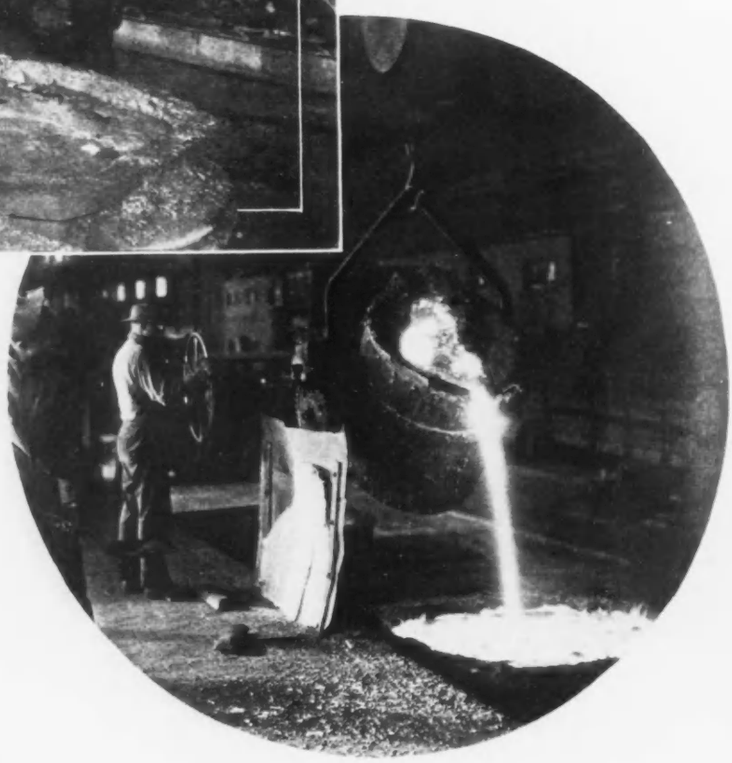
Refining is done in two 2-ton side-blown acid-lined converters, operating on a cycle of about 25 min. for each vessel. The metal is blown "full" with an analysis when teemed averaging C, 0.06; Mn, 0.03; P, 0.10; Si, 0.02; S, 0.05. In contrast with Bessemer steel practice, no additions are made to the ladle metal, and it is important also to bear in mind in such comparison that the ladle metal in the new process operation is merely a semi-finished material which subsequently undergoes completion of metalloid removal, and the important functions of degasification and deoxidation during the reactions involved in processing. The Bessemer converter is admirably adapted to the refining stage of the operation, producing metal in batches of moderate size on a relatively brief, steady cycle.

The slag incorporated in wrought iron is essentially a ferrous silicate, high in iron oxide. In hand puddling practice it is a combination of oxides resulting from the reactions of refining, with such additional ingredients as may result from a fluxing of materials on the furnace hearth. It will vary somewhat, for good or evil in results, with the nature of the charge material, individualism in practice, and character of furnace materials. A typical composition is FeO, 70 to 75 per cent; Fe_2O_3, 5 to

*This paper was prepared for presentation at the Cleveland meeting of the American Institute of Mining and Metallurgical Engineers to be held in September, 1929. Copyright, 1929, by the Institute.



FIRST a "Thimble" Is Partly Filled with Iron Silicate Slag, Melted in a Tilting Open-Hearth Furnace, and Then a Weighed Amount of Blown Bessemer Steel Gradually Poured Into the Thimble. Rapid cooling of the steel liberates gases so rapidly that the metal disintegrates into a sponge



10; SiO_2, 10 to 12; MnO, 2; Al_2O_3, 2; P_2O_5, 2; and occasional or small amounts of CaO, MgO, or other oxides. The iron silicate is the important or dominant ingredient, with the others secondary or merely incidental.

In the new process, preparation of the slag consists of independent melting of the constituent ingredients in the proportions for the desired composition. Puddling-furnace tap cinder (where available), heating-furnace cinder, roll scale, iron ore, and sand represent available sources of supply. The composition is maintained in close conformity to the slag found in good wrought iron, with adjustments in line with experience which has shown that improved characteristics of product may be obtained.

The melting is done in a tilting regenerative open-hearth furnace, oil-fired, of 20-ton steel rating. It is of standard type, magnesite lined, but with additional water cooling to protect the hearth from the heavy scouring action of the molten slag. Make-up slag is transferred in a ladle to the processing floor as required.

Disintegration of the metallic mass is the dominant feature in the manufacture of wrought iron, in order that a sponge shall be formed to serve as a carrier of the slag. This phase of the new process probably represents the first recognition of the dominance of this feature and a consequent concentration of effort in devising effective means of comminution; it is the keystone of the new process.

The operation is carried out in a set of unlined, stationary cups or thimbles, resting upon standards along the pouring platform. The average heat of blown metal is about 5000 lb., and this formed into two balls, for which two cups are employed. The cups are rectangular, roughly 3 by 4 ft. in bottom dimensions, and 5 ft. deep; with considerable taper to the top. One of the cups carries about 2½ to 3 ft. of slag, brought on as needed from the melting furnace. Into this slag, about 2500 lb. of blown metal is poured in a steady stream over the lip, as shown in the illustration. The weight and rate of pouring are under observation on the crane scale from which the ladle is suspended. The average pouring time is about 3 min., being equivalent to a 1 to 1½-in. nozzle stream.

During pouring, there is marked churning and agitation of the slag, with a boiling action causing it to rise to the top of the cup; but there is no violence in the observable reactions. From time to time moderate amounts of cold granulated slag are shoveled into the cups during pouring, largely for the purpose of quieting a too vigorous boil, which might cause the rising slag to flow over the rim of the vessel.

Immediately upon completion of the pour, the boil subsides and the slag level goes down markedly. The cup is picked up with the crane, and the excess slag is poured into the adjoining empty cup, which is then ready to receive the remaining half of the ladle metal. The decanted cup now contains the solidified, spongy mass of metal, intermingled with liquid slag, conforming in all respects to the product of the best hand puddling practice. The ball is dumped upon a carriage, and transferred to a hydraulic press to be compacted into a bloom. Naturally, the slag take-up of the ball necessitates a make-up supply to the cups from time to time, as indicated by the level of slag in the vessels; the general requirement with present practice approximating 600 lb. per ton of wrought iron produced. It must be realized, however, that the slag incorporated in the wrought iron is very much less than the melting make-up, since the greater part is recovered after squeezing.

The ball, which is at a welding heat, is compacted to a solid, rectangular bloom about 12 by 14 in. by 5 ft., in a manipulator type hydraulic press, and is immediately sent to a 29-in. three-high blooming mill, where it is

roughed down to appropriate sizes. On the same heat, additional rolling in a 24-in. three-high mill produces the shipping product, either billets suitable for a direct rolling to skelp, or standard muck-bar sections used for piling. A steadily increasing proportion of the output is in billet form.

Fundamental Principle of New Process

The simplicity, positiveness, and smoothness of the operation is a matter of general comment. While operations are simple, they are built upon physico-chemical principles.

Refining of the base metal and the preparation and melting of the slag need no explanation. The mechanical admixture of base metal and slag is the crux of the situation. The execution is most effective if one is solid and the other liquid; preferably a solidification of the iron, because of its higher fusion point and preponderant volume in the product. The metal is poured at a temperature in excess of its fusion point of 2750 deg. Fahr., while the slag, liquid at all stages of the operation, has a general working temperature of about 2300 to 2400 deg. Fahr. Under present operating conditions, the slag volume relative to metal poured into the cup is six or eight to one. This is considerably in excess of the quantity needed to absorb the heat of solidification of the metal, without becoming superheated to a temperature above or dangerously near the fusion point of the iron. With these conditions, therefore, the slag is an active quenching medium which solidifies the metal promptly and continuously as it enters the bath.

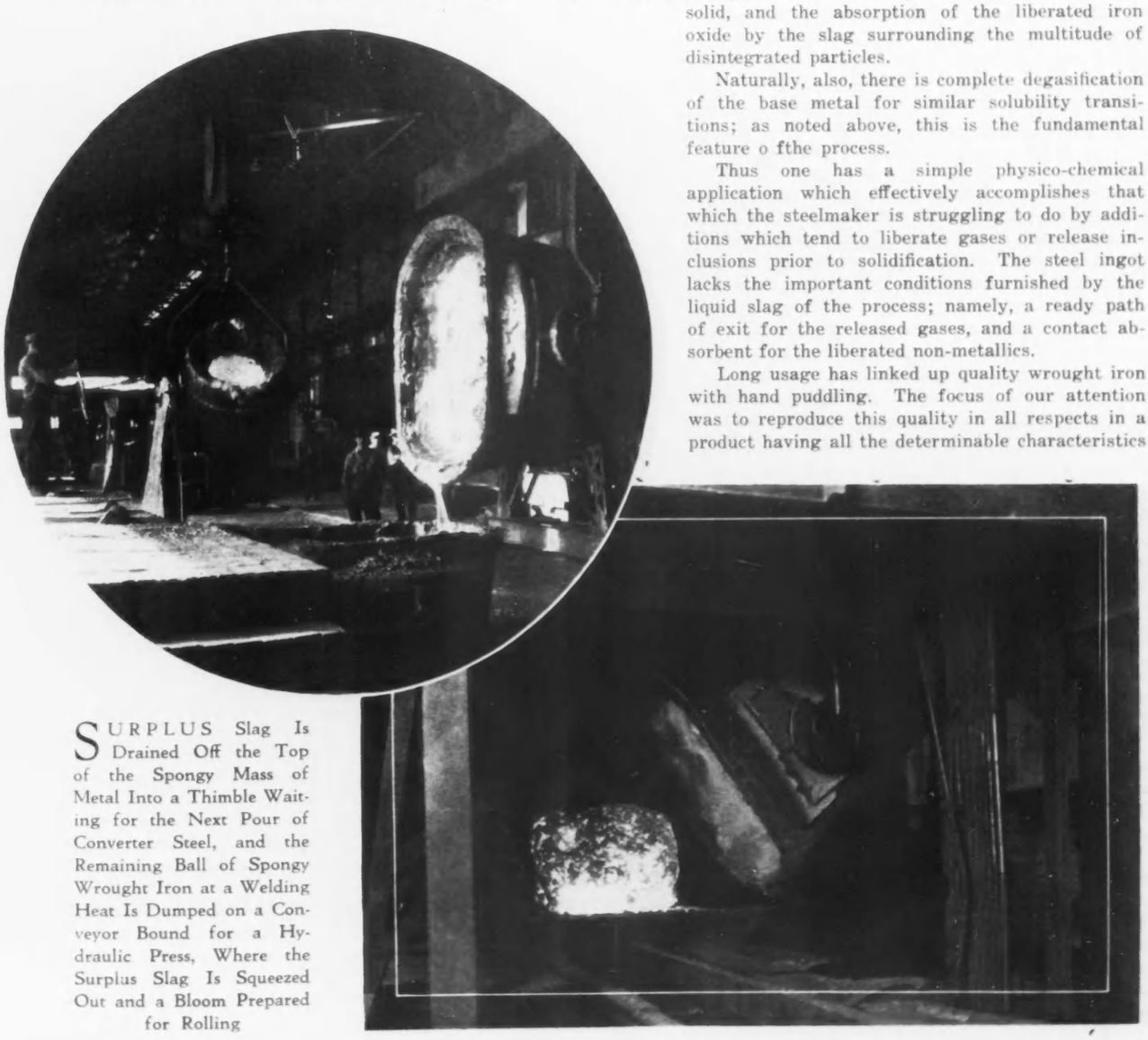
Accompanying this is the all-important principle upon which the process is founded. It is a well-established fact that molten iron or steel carries large volumes of gas in solution; and that the solubility relationship becomes nil upon change from liquid to solid. The rate of gas evolution is proportional to the speed of solidification. The operating conditions of the process as described are such that the metal is shattered by the gas evolution as it solidifies. Being heavier than the slag, it settles to the bottom of the cup as a spongy mass, which coheres as a result of a welding temperature automatically maintained in the heat exchange.

There are some interesting and important accompaniments of this operation. In view of the oxidizing and basic nature of the slag, the metalloid content of the blown metal is appreciably reduced during pouring, particularly with respect to carbon, manganese, and sulphur. In fact, with increasingly higher carbon metal, the additional gas created by reaction of carbon with the iron oxide of the slag may bring about a violent reaction resulting in a heavy boil and overflow of a slag from the cup. And yet the seemingly paradoxical result is reached of effective deoxidation of the base metal by reason of the change of solubility of iron oxide in iron from a considerable degree to nil on change of state from liquid to solid, and the absorption of the liberated iron oxide by the slag surrounding the multitude of disintegrated particles.

Naturally, also, there is complete degasification of the base metal for similar solubility transitions; as noted above, this is the fundamental feature o fthe process.

Thus one has a simple physico-chemical application which effectively accomplishes that which the steelmaker is struggling to do by additions which tend to liberate gases or release inclusions prior to solidification. The steel ingot lacks the important conditions furnished by the liquid slag of the process; namely, a ready path of exit for the released gases, and a contact absorbent for the liberated non-metallics.

Long usage has linked up quality wrought iron with hand puddling. The focus of our attention was to reproduce this quality in all respects in a product having all the determinable characteristics



SURPLUS Slag Is Drained Off the Top of the Spongy Mass of Metal Into a Thimble Waiting for the Next Pour of Converter Steel, and the Remaining Ball of Spongy Wrought Iron at a Welding Heat Is Dumped on a Conveyor Bound for a Hydraulic Press, Where the Surplus Slag Is Squeezed Out and a Bloom Prepared for Rolling

of wrought iron. The results have measured up to the objective. The material conforms to all standards set for wrought iron—chemical, metallographic, and physical; a conclusion subscribed to by many investigators, including railroad and government representatives, after careful examination and test. This is confirmatory of our own studies in laboratory, mill and field.

In many respects, the new process product has superiority of quality. Greater uniformity results from the controllability of operations and the elimination of individualism. There is benefit in the added work put upon the larger mass in squeezing and rolling. Uniformly low content of carbon in the blown metal has resulted in virtual elimination of blisters, the bane of wrought iron manufacture. Low metalloid content, and particularly the controllability and adjustability of metal and slag character independently, has benefited the welding and other physical properties of the product. In addition, this operating advantage points the way to the manufacture of wrought iron of special characteristics and adaptability, including the possibility of entry into the alloy field.

It is almost needless to point out the advantages accruing from the general parallelism to steelworks' practice in equipment, personnel, and operating procedure. Tonnages of individual blooms and in the aggregate are a matter largely of engineering expediency. The all important item of lowered costs of manufacture is an accompaniment. In comparison with steel manufacture, the new process has certain special features which add to the cost, but they may be largely offset by such items as ferro-alloys, molds, soaking pit charges, and cropping, which enter into the cost of steel production.

While the concentration of effort in the development was upon the production of quality wrought iron without thought of process involved, it is interesting to note the exact parallelism of the new process to the reactions and accomplishments of hand puddling. Melting, refining, and slag formation involve identical fundamental principles and reactions and need no elaboration. The "opening" or "graining" of the iron as it "comes to nature" has been generally conceded as the special art of the puddler and a stumbling block in the development of mechanical puddlers. It is a misconception that disintegration is the direct result of physical effort of the man or machine; disintegration is the result of degasification on solidification of the iron as its fusion point passes the operating temperature of the furnace when the metal nears the end point in carbon elimination. Effort is necessary primarily in an attempt to bring all portions of the refining mass into the favorable zones of reaction, as contrasted with the unfavorable conditions of relatively cold interiors or furnace bottoms. The physico-chemical forces of reaction are identical; except that in the new process they are more effective and more uniformly executed due to the more favorable operating condition of approaching the reaction or solidification from above with a fully and uniformly refined iron, rather than rising into the solidification range with an irregularly refined metal. The new process may be classed as puddling in the logical interpretation of reactions and accomplishments.

The Future

The Warren operation is serving a useful purpose as a proving ground. Construction is well under way on a new plant being erected by the A. M. Byers Co. at Economy, Pa., in the Pittsburgh district. The Bessemer converters, bottom blown, will be of 10 tons capacity, and the balls produced will be about 2 tons in weight. A more rapid operation will be obtained by a cup-car system of handling, with progressive movement of the cars to the several zones. Initial production will be 600 gross tons per day, with only minor extensions to double or treble this output. Immediate mill equipment will be blooming, plate, bar, and skelp mills; with projected extensions to include blast furnace and coke oven plant and finishing mills. This project should put wrought iron into its proper place in the field of ferrous products, through an expanding market made possible by lowered costs, greater tonnages, and diversification of output.

Metal and Machinery Makers Pay Highest Wages

Employment and wages in the manufacturing industries during 1928, as measured by the National Industrial Conference Board, contained remarkably few fluctuations. The periods of low output in one industry were apparently balanced in large measure by higher activities in others. The general business situation was stable, and wage rates (as expressed in average hourly earnings) are fairly well standardized. Changes affect more the number of hours worked weekly and the number of workers employed than they have the rates paid for labor.

Average hourly earnings of all wage-earners in 25 manufacturing industries reporting was 57c. per hour, with a deviation of ½c. up or down during the year. This is about 230 per cent of the average hourly rate for 1914 (24.5c.). The average weekly earnings also varied but slightly, between $27.09 and $27.76. This shows the average week to be 48 hr., three and a half hours shorter than in 1914. Thus the working week has grown shorter, and computations by means of cost-of-living indexes show that the pay will buy about 1/3 more than the somewhat longer week in July 1914.

Subdividing these average figures, it is found that earnings of skilled male workers tend toward a rate of 65c. per hour. Unskilled men earn 50c. as a maximum, and women's rates approach 40c. per hour. Whereas such women as were employed worked nearly as long as the men in 1914, last year the average week for women was 42½ hr., and for men 48½ hr. Skilled workers have a shorter week than unskilled (1 hr. difference).

Segregating the weekly earnings by industries, it is found that the metal working and producing industries are near the top, having four out of the top six, the other two being in the printing trades.

	Average for All Wage-earners		
Industry	Hours per Week	Hourly Rate	Weekly Earnings
Iron and steel	54.3	$0.646	$35.13
Automobiles	47.9	0.683	32.67
Heavy machinery	47.7	0.657	31.34
Agricultural implements	49.9	0.625	31.16
Machines and machine tools	49.3	0.608	29.99
Electrical manufacturing	45.9	0.615	28.25
Hardware and small parts	47.5	0.542	25.72

British Develop an Improved Electric Resistor Furnace

An electric resistance furnace developed in England is claimed to have certain marked improvements. It was described by Dr. W. Rosenhain and W. E. Prytherch in a paper before the last meeting of the British Institute of Metals. Higher available working temperatures are claimed for the furnace, up to 1400 deg. C., also durability and freedom from oxidation of the carbon resistor. The heating element of this type of furnace consists of carbon, or graphite, pellets, or short rods placed end to end in a refractory sheathing tube which fits easily over them. Heating occurs by contact resistance. The sheathing tube prevents the access of air sufficiently to avoid any appreciable burning of the carbon.

Leaching Manganese Ore With Ammonia

Bradley Process, Successful in 4-Ton Pilot Plant, Produces High Grade Oxide from Silicious Cuyuna Ore

IN view of the oft-repeated statements that American manganese producers are about to market a concentrated ore, suitable for the production of ferromanganese, the description of the so-called Bradley process appearing in *Engineering and Mining Journal*, June 29 and July 6 is interesting. According to the author, Carl Zapffe, manager of iron ore properties, Northern Pacific Railway Co., the process is the result of more than five years' intensive research by Wilson Bradley, an engineer of Deerwood, Minn., assisted by such well-known men and firms as Dr. Charles A. Doremus, E. P. Mathewson, and H. A. Brassert & Co. Much of the preliminary work was done in the laboratories of John C. Wiarda & Co., Brooklyn, N. Y., and the Dorr Co., Westport, Conn., although the whole process has been verified in a pilot plant with 4 tons daily capacity.

The work was done primarily to find a way to treat the low-grade silicious ores of the Cuyuna district, occurring in great tonnages at the surface. A typical analysis (natural) is

Manganese	13.5 per cent	as MnO_2
Iron	24.8 per cent	as Fe_2O_3
Silica (SiO_2)	22.1 per cent	
Alumina (Al_2O_3)	2.2 per cent	
Lime (CaO)	0.9 per cent	
Combined water	8.0 per cent	
Moisture	10.6 per cent	

Going on the assumption that some chemical method would be necessary to separate the metallic oxides, a number of solvents were tried. It was finally found that ammonium sulphate would take MnO and FeO into solution rapidly. It was also found that roasting the ore in a reducing atmosphere at low temperature will reduce 90 per cent of the MnO_2 to MnO, and very little of the Fe_2O_3 to FeO. The manganese sulphate in the filtered solution is then precipitated by ammonia gas, which action simultaneously regenerates the solvent, ammonium sulphate. The precipitated manganese oxide is dried and sintered, ready for smelting.

Mr. Zapffe estimates the operating figures for a plant (already designed) to produce 50 tons of manganese sinter per day. Ore would be crushed wet in ball mills to 65 mesh, the pulp thickened and filtered, and the filter cake dried. This fine ore would then be roasted in a rotary furnace at 750 deg. Fahr. The furnace atmosphere would contain CO_2 and CO in the relationship of 16 and 20 per cent. Extra time or higher temperature increases the proportion of iron oxide reduced to FeO; most of the iron after roasting is in the form of the magnetic oxide Fe_3O_4, insoluble in this process.

The roasted ore is then leached in counterflow digestors containing 16 times its weight of 10 per cent ammonium sulphate solution (temperature is not stated). Free ammonia is produced here, according to the following equation:

$$MnO + (NH_4)_2SO_4 = MnSO_4 + 2NH_3 + H_2O$$

A correct amount of the pulp is withdrawn continuously, filtered and the liquor sent to a precipitating tower, where it meets the ammonia gas piped over from the digestor. This gas precipitates the manganese and regenerates the ammonium sulphate solution, thus:

$$Mn\ SO_4 + 2NH_3 + 2H_2O = (NH_4)_2\ SO_4 + Mn\ (OH)_2$$

The manganese hydrate is deflocculated by an air jet, settled, washed free of sulphur, and filtered. After drying the granular product is mixed with a little fine coke and sintered.

It is possible that the tailings, which contain magnetic iron oxide, can be passed through a magnetic concentrator, and the concentrate sintered into a useful iron ore.

Mr. Zapffe says that 5.2 tons of Cuyuna ore will be required to make one ton of manganese sinter of the following composition:

Manganese	67.3	per cent
Iron	4.8	per cent
SiO_2	2.7	per cent
Phosphorus	0.01	per cent
Alumina	0.35	per cent
Magnesia	0.16	per cent
Carbon	0.25	per cent
Sulphur	0.01	per cent

1.5 tons of iron ore sinter and 1.3 tons of waste will also be produced. About 150,000 cu. ft. of blast furnace gas (or its equivalent) will be required to reduce 5 tons of ore, and 80,000 cu. ft. more for drying, evaporation, and miscellaneous purposes. For each ton of sinter, 20 lb. of fresh ammonium sulphate and 7000 gal. of water will be needed to replace losses; also 20 kw-hr. of electric current for grinding, pumping and lights. A plant making 50 tons of sinter daily can be operated by 10 men per shift, plus a foreman and a chemist. Estimated cost per ton of the product is not published.

A letter from A. J. Boynton, vice-president, H. A. Brassert & Co., states "Our study of the technology involved has extended over a period of a year or more. We believe the process to be technically correct and practically controllable. The apparatus required is standard in the metallurgy of the higher metals, and is obtainable from firms of high commercial and engineering standing. We regard the process as experimental only with respect to adjustment of detail of construction and operation."

High-Elastic Steel Popular with British Shipbuilders

Experience with high-strength structural steel for ships' hulls has been so gratifying, according to F. G. Martin, metallurgist for the Liverpool shipping concern, Alfred Holt & Co., that it is now wholly a matter of balancing initial cost of the vessel with its increased earning capacity. A reduction of 10 per cent of the dead weight has been effected in more than one instance, said Mr. Martin, speaking before the West of Scotland Iron and Steel Institute. Several vessels are under order in which about half of the total weight of the steel will be a high-elastic limit mild steel. Another steel, known as the "33-38-ton material," had been used in small amount, but experience with it has necessarily been short and limited.

Using Ram-Up-Cores for Castings

Method of Making Automotive Pistons and Large Bracketed Pieces—Ram-Up Chaplet Cores

BY PAUL R. RAMP*

MOLDING automotive pistons is often done in the same manner as for pulleys. In such cases the pattern consists of a plain ring or pot, the proper diameter inside and outside. Before the core is rammed up the ram-up-core is dropped into the ring in the same manner as the core was dropped into the pattern in Fig. 6. [First section of article.] This ram-up-core forms the connecting rod bosses, brackets and ribs that are part of a piston.

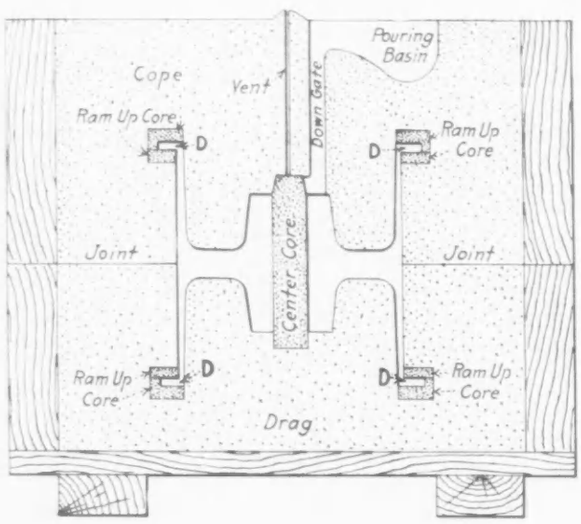


FIG. 7—Cross-Section of Flange Pulley Mold, Using Several Ram-Up-Cores to Form the Annular Flanges

Another illustration of the use of ram-up-cores in the molding of a flange pulley is in Fig. 7, a cross-section of a flange pulley mold. To make a casting of this kind without ram-up-cores, it would be necessary to make the mold in a three-part flask. Or the part of the mold between the flanges might be formed with two ring cores; one to be hung in the cope part of the mold and the other to be placed in the drag part. Another method would be to have the flange section of the pattern loose, and to draw the loose section out and cover the flange part of the mold with a covering core.

An objection to the three-part flask for making this mold is the additional labor required to ram up one more section of flask. The objection to using ring cores between the two flanges is the danger there is of misplaced cores. There is additional cost in making these cores, as they must be large enough to have sufficient bearing on a print that is wide enough to support them and hold them in their proper place. In addition to this, there is always danger of these ring cores being misplaced, and reducing the thickness of metal on the face of the pulley or similar casting.

The use of loose-flange patterns and covering cores to form these flanges is an unsatisfactory plan, as there is always danger of the covering core getting broken while the sand is being rammed over it. Although this may not occur, it is decidedly hard to be sure there is no loose sand in the flanges. Considerable trouble is experienced also in ramming the loose-flange patterns out of line with the main pattern.

Fig. 7 is a plan of using ram-up-cores to form the flanges, which are indicated by *DDDD*. These ram-up-cores consist of two light ring cores, which usually are pasted together before they are used. One part of these two cores fits snugly around the outside diameter of the pulley rim pattern, and the upper section of the ring core rests on the upper edge of the pulley rim pattern. This plan holds the core in its proper place, and also prevents loose sand from working into the part of the ram-up-core that forms the flanges, while the mold is being rammed.

In making molds of this kind, often the part of the mold which forms the highest point in the cope side is rammed too hard or is not properly vented. As a result a blowhole occurs on the edge of the rim pulley wheel. When ram-up-cores are used they form the outer edge of the rim as well as the flange, and there is no danger of hard ramming causing a blowhole at this point. So the ram-up-cores in this case not only simplify the molding method but protect the high points against hard ramming.

In Fig. 8 is a cross-section of a loam mold for a 10-ft. generator support casting, in which are several brackets. Instead of using brick and loam to form these brackets, ram-up-cores were placed in their proper position and the wall was built around them. There is nothing unusual about this, but it is another illustration of the varied use to which ram-up-cores may be put. If these brackets had been formed of brick and loam, it would have required more labor to make the mold and greater care to finish it, and would have increased the danger of the casting cracking when cooling.

Ram-up-cores are used extensively in loam molding in places where nozzles and projection flanges and other

*Superintendent of foundry and pattern shop, Newport News Shipbuilding & Dry Dock Co., Newport News, Va. The first section on this article appeared in our issue of June 6, page 1549.

irregularities occur which are difficult to make with loam and brick. These ram-up-cores are generally underdried, as they receive a second drying when the mold is placed in the oven.

In many cases the arms and hub of large pulleys are formed by the use of ram-up-cores and the arms and hubs of large flywheels are made in this manner. Brackets, bearings and bosses on automobile crankcases are generally formed with ram-up-cores. They have a prominent place in all production work. The advantage of a ram-up-core over a core placed in a core print is the absence of fins, of variation of metal, and of misplaced cores. They also avoid deformed cores, because seldom can a deformed core be used if it is a ram-up-core, as it will not fit properly into or against the pattern, whereas a core that is placed in a print can be used and the deformity is not discovered until after the casting is cleaned.

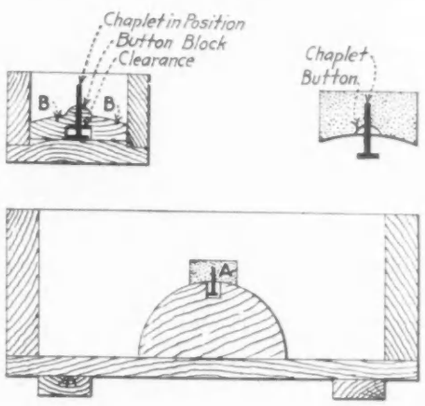


FIG. 10—Cross-Section of Pipe Mold in Which Ram-Up Chaplet Cores Are Used (at Right)

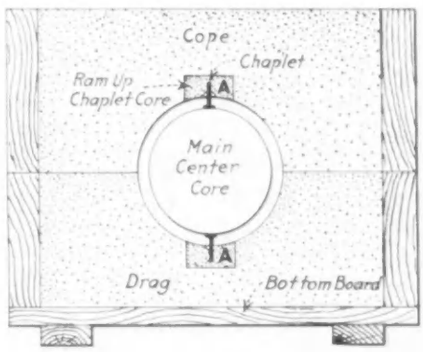


FIG. 9 — Drag Flask (Above) Ready to Ram, with Ram-Up Chaplet Core in Position on Pattern. Detail at left is cross-section of ram-up chaplet core box; at right, cross section of ram-up chaplet core

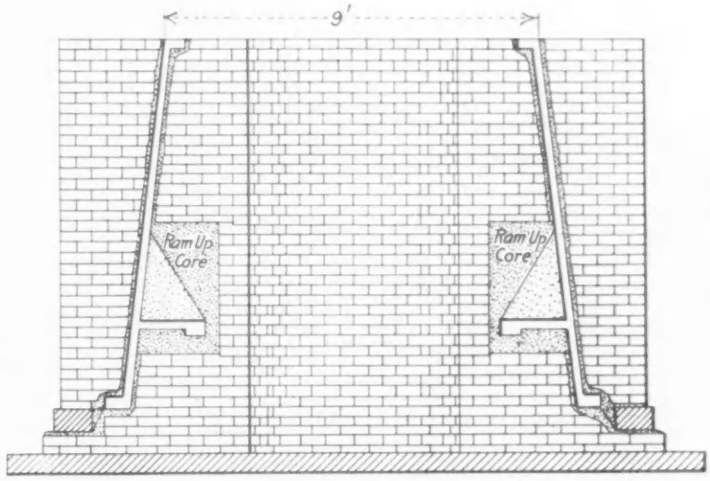


FIG. 8—Cross-Section of Mold Made in Loam to Produce a Generator Support Casting 10 Ft. in Diameter at Bottom and 9 Ft. at Top (at Left)

Ram-up Chaplet Cores

Another type of ram-up-core is the ram-up chaplet core, which has considerable use. In Fig. 9 (upper left) is a cross-section of a core box used to make a ram-up chaplet core for a small pipe. The small stem chaplet, which in many cases can be an ordinary wire nail with a large head, is shown in position. This chaplet is held in place by the loose blocks in the bottom of the core box, indicated by *BB*.

The clearance space in these two blocks is necessary, to make it possible to draw the loose pieces out of the core without disturbing the stem chaplet. This clearance space is necessary also on account of the button which is to be formed around the stem of the chaplet. The operation is to place the stem chaplet in the core box, place the loose blocks in their place so that they hold the stem chaplet in position, ram the core box full of sand, rap and draw the core box off the core, draw out the loose blocks *BB* and the core is made.

At upper right of Fig. 9 is a cross-section of such a small ram-up chaplet core. The chaplet is shown in position extending through the center of the button. The large view in Fig. 9 is a cross-section of a pipe pattern lying on the molding board, with the drag in place and the ram-up chaplet core *A* in proper position.

It will be noted that a slot is provided in the pipe pattern to allow the stem chaplet to extend into the pattern to the proper depth. This depth represents the thickness of metal we will have between the core and the outside of the mold. The molding operation is to place the pipe pattern in the flask, ram-up chaplet core on the pattern with the chaplet extending into the slot cut out for it, then fill the flask with sand and ram it.

Fig. 10 is a cross-section of a pipe mold complete ready for pouring, with the main core being held in position by the use of ram-up chaplet cores. This is a case where the chaplets are placed in the mold before it is rammed up. This is an effective method in cases where it is too expensive to place the chaplets after the mold is made, or it is not desirable to use double-headed chaplets. Of course, such cases exist only where the work is very small and light.

Steels at Elevated Temperatures

Their Response to Stress—Development of the "Time-Yield" Factor as Aid to Engineer in Designing Structures

BY DR. W. H. HATFIELD*

IT is proved that steels may be plastically deformed by stresses, imposed over long periods, which would be without measurable effect when imposed over short periods. Clearly, if the designer is to devise plant and machinery which can be safely operated at higher temperatures under diverse influences, the first problem is to determine the value of stress which can be borne indefinitely without plastic deformation.

Steels must have an elastic range, i.e., a range of stress within which they behave as practically elastic bodies. This follows from the fact that they are crystalline aggregates, and it holds good for the crystalline phase irrespective of temperature, or, how would the atoms orientate themselves to the space lattice? It is clear that a stress of a certain magnitude must be applied to destroy the lattice, otherwise it will persist. At low temperatures the order of stress required is relatively high; at high temperatures it is only nominal. When cohesion is overcome plastic deformation results.

Limited by Need for Minute Measurement

Our difficulty today lies in the severe limitation as regards sensitivity of measurement. In our own researches we work to a direct observation of 1/40,000 in. Others claim to be working to a direct observation of 1/1,000,000 in. But it will be quite clear that deformation may, under certain conditions, be proceeding at a rate which is so slow as not to be observed, even with the most delicate measurement, except over the longest periods of time.

This fact gives an opening for the expression of the abstract idea that any metal will be deformed under any stress, given a long enough period of time. It is one of those propositions difficult to establish, and equally difficult to disprove. Nevertheless, on general grounds, the author holds the contrary view, that steels have elastic ranges over the range of temperature in which the engineering world is interested, and, further, that it is our business to know what those ranges are. The point at issue is whether we can, or cannot, give the engineer a factor of safety as regards the time effect in the expectation of life of the part concerned. The answer is in the affirmative.

Helping the Engineer to Design

I have heard the view expressed by turbine engineers that they would be in position to design adequately, with resultant suitable factors of safety, if they had data concerning the stresses below which the rate of creep would not exceed 0.000001 in. per in. per hr.

An extremely valuable summing up of the present position as regards the properties of steels for use in connection with superheated steam has been given by R. G. C. Batson, typical data concerning the limiting creep stress being disclosed in the tables.

These data relate to mild-carbon steels, and Mr. Batson states that, even by increasing the strength of the

*Brown-Firth Research Laboratories, Sheffield, England. This is abstract of a paper read before the West of Scotland Iron and Steel Institute.

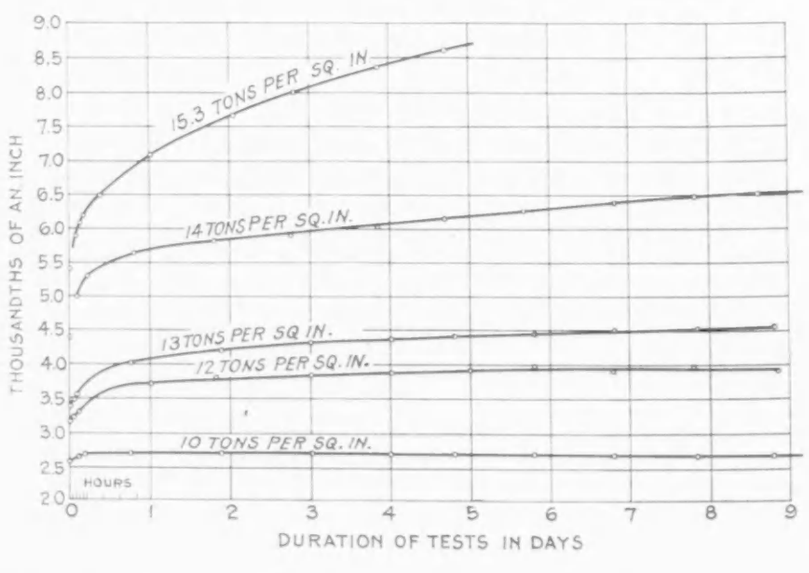

15.3 TONS PER SQ. IN.
14 TONS PER SQ. IN.
13 TONS PER SQ. IN.
12 TONS PER SQ. IN.
10 TONS PER SQ. IN.
THOUSANDTHS OF AN INCH
HOURS
DURATION OF TESTS IN DAYS

FIG. 1—Tests of 0.42 per cent Carbon Steel at 400 Deg. C. (752 Deg. Fahr.). This steel, of which the limit of proportionality was 7.8 tons per sq. in., had been normalized at 860 deg. C. (1580 deg. Fahr.)

steel by increasing the carbon content, a limiting creep stress exceeding 5 tons per sq. in. cannot be obtained, even with a carbon content of 0.51 per cent, at 500 deg C. The limiting creep stresses stated are the result of work at the National Physical Laboratory.

Limiting creep stress as determined at that laboratory is the stress above which there is a steady, continuous creep of a measurable rate within the accuracy of their measurements. Testpieces are loaded for several months at different values of stress, and the rate of creep to which the pieces settle down is determined. From these rates of creep a curve is drawn from which a close estimate is made of the limiting creep stresses.

Accumulation of Data Is Disappointingly Slow

Four to five months are required to obtain a satisfactory value of limiting creep stress at one temperature. Clearly, therefore, researches having as their object the improvement of steel as regards an increase in the limiting creep stress are severely handicapped, owing to the great time required for discriminating examination of steels of varying composition and diverse heat treatments.

This unsatisfactory position has been dealt with in the Brown-Firth laboratories by arbitrarily deciding the conditions of the standarized test likely to be helpful in this direction. The method adopted consists in discovering, by static loading, the stress within which, at the temperature, stability of dimensions is attained within a period of 24 hr. for a further period of 48 hr., with an extension not exceeding the elastic deformation of 0.5 per cent on the gage length, with limitation as regards measurement for permanence of dimensions of 0.000001 in. per in. per hr.

What the Time-Yield Is

This value I have named the Time-Yield. A single test for a given temperature in search of this value is obtained by this method in three days, and the matter is therefore brought, in point of time, within limits which permit a large number of tests being made in a reasonable period.

Fig. 1 indicates the effect of various loads on the manner of deformation at a given temperature. It gives the resultant curves due to loading 0.42 per cent carbon steel at 400 deg. C. (752 deg. Fahr.) under 15.3, 14, 13, 12 and 10 tons per sq. in. respectively. This graph clearly and definitely demonstrates that the Time-Yield, as herein suggested and determined, is a value which can undoubtedly form a safe basis for design; particularly having in mind that the period over which observation is made, taken in conjunction with the degree of accuracy of measurement, discloses movements of a less order than 0.000001 in. per in. per hr.

Steel for Boiler and Superheater Tubes

Temp., Deg. C	Temp., Deg. Fahr.	0.10 Per Cent Carbon Steel: Limit of Proportionality	0.10 Per Cent Carbon Steel: Ultimate Tensile Stress	0.10 Per Cent Carbon Steel: Limiting Creep Stress	0.17 Per Cent Carbon Steel: Limit of Proportionality	0.17 Per Cent Carbon Steel: Ultimate Tensile Stress	0.17 Per Cent Carbon Steel: Limiting Creep Stress
		Tons per Sq. In.			Tons per Sq. In.		
400	752	...	...	...	6.5	29.0	13.4
450	842	...	...	...	5.5	24.5	8.5
486	896	4.0	17.0	5.5	5.0	21.5	6.0
500	932	3.3	14.9	3.5	4.8	19.4	4.8
525	977	2.9	13.7	2.0	4.4	17.0	3.5
550	1022	2.5	12.1	1.3	4.0	15.0	2.4
570	1058	2.2	10.5	1.0	3.5	13.0	2.0
600	1112	1.9	8.4	0.6	2.8	11.0	1.2

0.23 Per Cent Carbon Steel for Superheater and Steam Drums

Temp., Deg. C	Temp., Deg. Fahr.	Limit of Proportionality	Ultimate Tensile Stress	Limiting Creep Stress
		Tons per Sq. In.		
400	752	6.3	26.0	13.5
470	878	5.3	18.5	7.0
530	986	4.0 (approx.)	16.4	4.0

It will be seen that, as the stress falls, the speed of deformation lessens, and that of 10 tons per sq. in., after a very small initial deformation, there is no further extension of the testpiece over a period of 9 days. This statement is, of course, governed by the sensitivity of measurement mentioned. But it will be clear to anyone accustomed to such experimental work that, if the stress is dropped to two-thirds of that required to fulfill the definition of the Time-Yield, i.e., no movement exceeding say, 0.000001 in. per in. per hr., we have indeed reached a stress which obviously will not produce measurable deformation within the reasonable life of machines or parts in which we are interested.

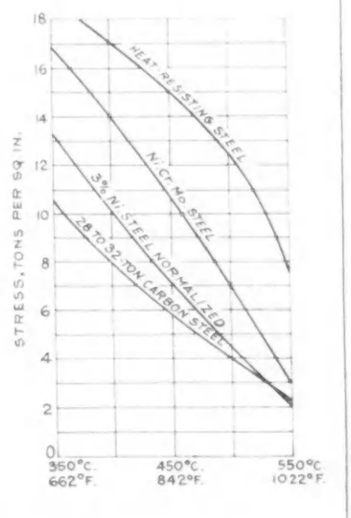


FIG. 2—Time-Yield Curves for Four Steels of Compositions Shown in Table

Data Applying to Specific Cases Vary

It will, of course, be appreciated that figures given apply to a specific analysis of material in a particular condition, and that the values will vary with modifications in analysis and condition. Also it is obvious that stability of dimensions will not be obtained until stability of structure for a given temperature is attained, since modifications in structure may lead to small volume changes which may be confused with changes in dimensions such as we are considering. Again, although it may be held to be a fundamental condition, yet the temperature stated should be attained and maintained; an experimental condition difficult to achieve except when the utmost precautions are taken.

In Fig. 2 will be found the Time-Yield curves for mild steel, nickel steel, nickel-chromium-molybdenum steel, and for a special heat-resisting nickel-chromium-tungsten steel. The details for these steels are given in the table on page 350.

Information at Hand for the Engineer

Fig. 2 contains information of immediate service to the designing engineer. The first curve to note is that of the mild steel, the material at present in use for the production of high-pressure boiler drums. With the increase in temperatures and pressures it has become of the utmost importance to know with certainty the maximum stress which can be imposed *without change of dimensions.*

So important are these drums that welded construction has rightly been displaced in the best practice by single hollow forgings. In spite of protestations to the contrary, welded joints are always more or less unreliable, since the least lapse in technique will result in oxide of iron being

left in the weld and unsoundness not infrequently results from unskillful filling in. Given, however, a single-forging drum and given a knowledge of the Time-Yield of the material for a given temperature, the engineer has his feet on solid ground.

May Stress to Two-Thirds the Limits Shown

As regards this mild steel the Time-Yield value is 7.7 tons per sq. in. at 400 deg. C., 5.7 tons at 450 deg. C., and about 4 tons at 500 deg. C. The deduction is that this steel may be stressed in service with safety to two-thirds the value of the loads stated. It has been the practice of the speaker to apply this over a long period of time as regards the products of the companies with which he is associated, and the whole thing pans out satisfactorily.

Over the range of temperature under discussion the 3 per cent nickel steel gives definitely superior results to the mild steel. Much more improved values are, however, obtained from the nickel-chromium-molybdenum steel, and this material is proving of great utility in several applications at such temperatures. The upper curve is typical of the values to be obtained from the nickel-chromium-tungsten heat-resisting steels.

Composition of Steels in Fig. 2

	C.	Mn.	Si.	Ni.	Cr.	Mo.	W.	Treatment
Mild steel	0.25	0.58	0.11	0.13	....	....	....	Normalized at 900 deg. C.
Nickel steel	0.24	0.55	0.20	3.3	....	....	....	Normalized at 850 deg. C.
Ni. Cr. Mo. steel	0.30	0.57	0.24	2.38	0.61	0.59	....	Oil hardened at 850 deg. tempered at 620 to 630 deg. C.
Heat-resisting steel	0.50	0.60	0.50	9.4	12.68	....	3.75	Air cooled from 1000 deg. C.

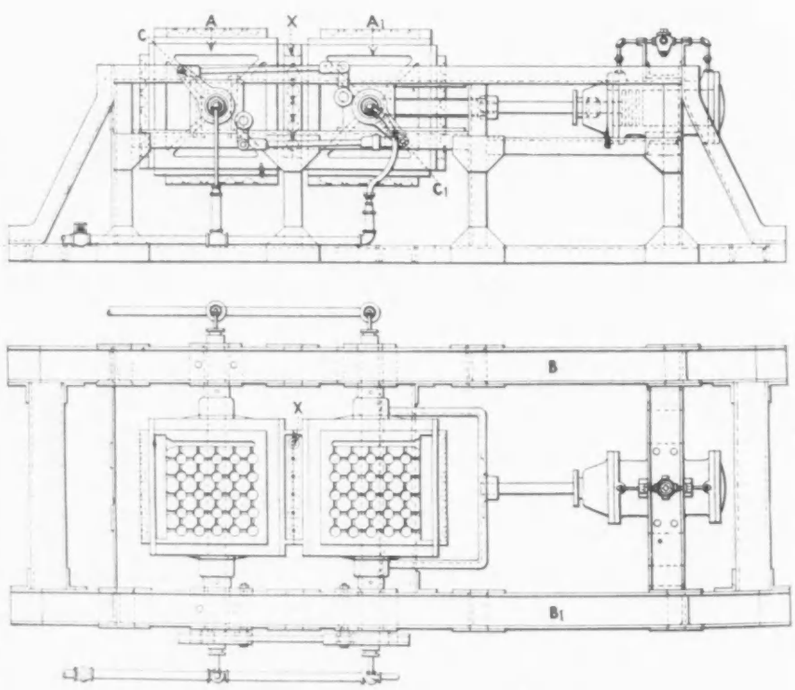
Creep tests and time-yield determinations can be made only over considerable periods and, therefore, the results of ordinary tensile tests at gradually ascending temperatures will be of interest. It must, however, be borne in mind that such figures have a relation, as yet, only incompletely determined as regards the response of the steel to stresses imposed over long periods of time.

Chill Mold for Making Steel Balls

A CASTING machine for chilled steel balls, to be used at mines or fine-grinding plants in isolated places where freight on a manufactured article is excessive, is described in detail by John B. Huttl of Honduras, Central America, in the *Engineering and Mining Journal* for May 18.

As shown by the drawing, it comprises two water-cooled cubical boxes, to four faces of which are bolted square die plates. When a pair of these dies are forced together by the air piston, 25 balls can be cast at one pouring through X. After the metal is chilled the two molds are pulled apart, each mold box turned 90 deg., the group of balls falls to the floor, a new pair of molds is closed, and operations continue.

Mr. Huttl recommends that the molds be milled from gray cast iron; a 21-in. square slab will make a half mold for 25 2-in. balls. Before the first cast is made, the molds should be preheated with a gasoline torch. Rock-drill parts, broken crusher jaws, in fact any steel scrap, is said to make satisfactory raw material, and produce a ball which will stand two or three blows from a steam hammer before breaking.



Permanent Mold for Chilled Steel Balls for Grinding Mills

No mention is made of the furnaces used for melting this steel scrap. A production of 1400 balls per hour has been made with three men—one caster, one cylinder operator, and a third for greasing the molds with spent crank case oil.

A study of the use of the gravity concentration process in the beneficiation of Alabama oolitic iron ores has been made by the United States Bureau of Mines in cooperation with the University of Alabama and the University of Missouri. The self-fluxing iron ores of Alabama are the foundation of the iron and steel industry of that State, says the bureau in a recently issued report. In addition to these deposits of self-fluxing ores, there are seams containing practically the same percentages of iron but too much silica. These ores at present are valueless, but if they could be concentrated by reducing the silica content, the ore reserves of the Birmingham district would be greatly augmented. The low cost of gravity concentration gives this process first rank in the beneficiation of iron ores. For this reason many experimenters have tried to concentrate the Alabama iron ores on tables. In the face of the early failure a new trial has been made and the results have justified the effort.

Michigan as a Steel-Producing State

Importance of Detroit as a Consuming Center Accounts for Construction of Nearby Steel Plants

BY C. E. WRIGHT

DETROIT, Aug. 6.—Steel companies in the Central District, particularly those making sheets and strips, are watching with keen interest the development of Michigan as a steel-producing State.

Ranking fourth in steel consumption among all the States, Michigan is now in seventeenth place in steel production. This will be changed somewhat next year when two new steel plants get into operation.

The new Great Lakes Steel Corporation, which is building a plant at Ecorse, a suburb of Detroit, will start making steel about one year hence. The new sheet plant of the Newton Steel Co. at Monroe, Mich., 30 miles below Detroit, may get started rolling steel sooner.

The Great Lakes plant will have open-hearth capacity and rolling mills sufficient for the annual production of about 400,000 tons of semi-finished and finished steel. Its finished products will be hot-rolled and cold-rolled strip steel, and it will supply the Michigan Steel Corporation, with which it is closely affiliated, with sheet bars. These the Michigan Steel Corporation now obtains from outside sources.

The Newton Steel Co., in its new plant at Monroe, will produce about 125,000 tons of sheets a year, which is approximately the present capacity of its mills at Newton Falls, Ohio.

As the Michigan Steel Corporation is now producing a like amount of sheets at its plant in Detroit, the automobile industry of lower Michigan will soon have a sheet production of a quarter of a million tons right at its front door.

Add to this an annual strip steel output of about 250,000 tons, which the Great Lakes Steel Corporation will be able to turn out, and Michigan will assume a fairly important position as a steel-producing State, not to mention the tonnage produced by the Ford Motor Co. for its own use.

The Detroit Steel Corporation is a contender for a portion of the cold-rolled strip business of the Detroit area, and another new cold-rolled strip producer just organized is the A. J. Bopp Steel Corporation.

These steel-making developments in Michigan raise the question as to whether the trend of new steel capacity will be toward producing steel nearer to its largest consuming centers. The early trend in the development of steel manufacture was to get close to sources of supply. Thus Pittsburgh became a steel center because of cheap coal, while plentiful supplies of ore and coal in Alabama brought about the upbuilding of steel manufacture in that section.

But today freight plays so large a part in steel distribution that low costs on raw materials do not always offset the expense of comparatively long hauls of finished steel.

The present freight rate on finished steel from Pittsburgh to Detroit, for example, is 29c. per 100 lb. This may be reduced to 26.5c. under the new mileage scale ordered by the Interstate Commerce Commission, but even so, it is about $4 a ton above the switching charge which Detroit plants will have to pay in getting steel to automobile manufacturers and other large consumers in Detroit.

Virtually every steel company in the country has a sales office in Detroit. For many companies the district supplies a greater amount of business than any consuming section in the country. What the effect on the competitive situation will be when the new capacity comes into play remains to be seen, but some companies whose plants are in other States are not viewing the outlook with equanimity. The tonnage to be supplied by the new Michigan mills must come out of other companies' tonnage unless there is a sufficient increase in steel consumption in the Detroit district to make up the difference.

A sidelight on the present race for business in Detroit is the considerable increase this year in the tonnage of steel that is being moved here by boat. The savings in freight, as compared with rail hauls, are generally obtained by the buyer, in whole or in part. Small consumers pay about the same for their steel as such buyers do in other districts, but large users are able to draw on Buffalo, Cleveland and Chicago mills for water shipments at lower delivered prices than are possible in many other sections of the country.

Locomotives Under Order Still Large in Number

WASHINGTON, Aug. 6.—Railroad locomotives to the number of 69 were shipped in July as against 78 in June, according to reports received by the Department of Commerce from the principal manufacturing plants. Of the July shipments 42 locomotives were for domestic use, 39 being steam and three being electric units. The 27 locomotives exported were of the steam type.

For the first seven months of the current year 388 locomotives were shipped as against 360 for the corresponding period of last year. Unfilled orders at the end of July of the present year totaled 539 locomotives as against 552 at the end of June. Both these figures were higher than unfilled orders for all of 1928 and the first five months of 1929. Of the locomotives on order at the end of July 490 steam and 18 electric units were for domestic account and 31 were steam locomotives for exportation.

Melting Practice and Other Papers at Metal Congress

Alexander L. Feild, chairman, program committee of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers has released the papers to be presented as the division's portion of the program for the National Metal Congress to be held in Cleveland the week of Sept. 9. Sessions will be held on Tuesday, Wednesday and Thursday, the Wednesday morning session being devoted entirely to the subject of ores, while the other sessions will be devoted to melting practice.

The Iron and Steel Division will join with the Institute of Metals Division of the A. I. M. & M. E., which is also presenting a program during National Metal Week, in a dinner to be held at Hotel Cleveland on Tuesday evening, Sept. 10.

Other societies presenting programs during the week besides those mentioned, are the Iron and Steel Division of the American Society of Mechanical Engineers; the American Welding Society and the American Society for Steel Treating.

The papers for the Iron and Steel Division meeting of the mining engineers are as follows:

"Change in Microstructure of iron at the A_3 Transformation Points," by B. A. Rogers, Western Electric Co., Chicago.

"New Development in Wrought Iron Manufacture," by James Aston, Carnegie Institute of Technology, Pittsburgh.

"Viscosity of Blast Furnace Slags," by R. S. McCaffery, University of Wisconsin, Madison, Wis.

"Fluorspar and Its Uses," by Earl Brokenshire, Oglebay, Norton & Co., Cleveland.

"Foreign Iron Ores," by Charles Hart, Delaware River Steel Co., Chester, Pa.

"Iron Ore Sinter," by G. M. Schwartz, University of Minnesota, Minneapolis, Minn.

"Bradley Process for the Beneficiation of Manganiferous Ores," by Carl Zapffe, Northern Pacific Railroad, Brainerd, Minn.

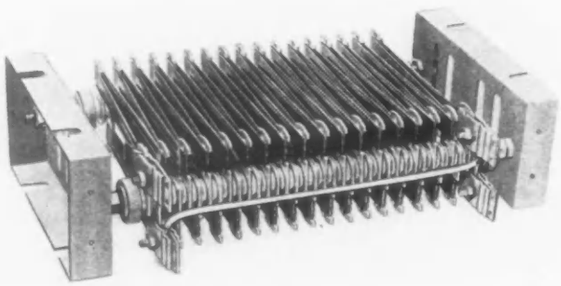
"Diffusion of Iron Oxide from Slag to Metal in the Open-Hearth Process," by C. H. Herty, Jr., United States Bureau of Mines, Pittsburgh.

"Experimental Determination of Equilibrium in the System Carbon-FeO in Molten Iron," by A. B. Kinzel and J. J. Egan, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.

"Rate of Carbon Drop and Degree of Oxidation of the Metal Bath in Basic Open-Hearth Practice, II," by A. L. Feild, Union Carbide & Carbon Co., New York.

New Resistor Described As Unbreakable

DUR-ristor, a new resistor described as unbreakable, with a continuous resistance element, is announced by Cutler-Hammer, Inc., Milwaukee. Advantages emphasized include vibration-proof and unbreakable, non-corrodible, light of weight and compact.



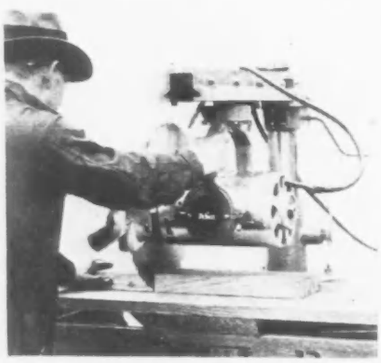
The Resistance Element Is Continuous and Is Arranged to Permit Expansion and Contraction

The main body of DUR-ristor, the resistance element, consists of two strips of a rust-proof, non-corrodible alloy. They are proportionally ribbed on the sides as well as on the turning edges. A new method of supporting the strips, combined with the ribbing, serves to allow the strips to expand and contract freely during temperature changes. Mica is used for all insulation.

The DUR-ristors, regardless of ampere rating, are of equal size. The thickness of the resistance strip is the only part that varies according to ampere rating.

Improved Wood-Working Machine

INCREASE in power by some 50 per cent, and more convenient arrangement of the dial plate for making angle settings are features of the improved model D "Wonder Worker" wood-working machine built by De Walt Products Corporation, Leola, Pa.



A 5-hp. Motor of New Design Provides More Power with Less Temperature Rise

By means of various attachments, ripping, cross-cutting, dadoing, mitering, beveling and many other operations can be done on the one machine. Fir 4-in. thick is said to be ripped at the rate of 50 lineal ft. per min. Cross cutting of 6-in. material is within the capacity of the machine and the change from cross cutting to ripping may be made instantly without turning off the power.

A two or three phase 5-hp. motor of new design is employed, providing more power at full load, with less temperature rise. The dial plate with degree markings and pitch scale is now directly located in front of the operator and is notched at each 45 deg., which facilitates making adjustments for angle or bevel cutting. A locking device actuated by a convenient hand-lever has been provided for locking the motor quickly and positively in any cutting position, and provision has been made for quick changing of tool attachments. The cutting tool is completely guarded in all positions.

The machine weighs 340 lb. and is portable. It is fitted on a 29 x 59-in. table that can be handled by two men.

Scarfing Tip for Deseaming Billets

TO speed up the scarfing of billets and keep down the cost, the Weldit Acetylene Co., Detroit, offers a scarfing tip for its model S torch. The tip makes a cut such as is indicated in the accompanying reproduction of a photograph, which shows a torch cutting of a seam or surface defect in the steel. The billet so treated is then re-rolled immediately with little or no loss of time or heat.

Another field offered for the scarfing tip is the preparation of plates for electric welding. The plates are placed together in proper position and the scarfing tip passed over the contact edges giving a groove with fresh surfaces ready for the electrically melted bead.

Scarfing Tip Is Used to Remove Surface Defects of Billets So That Rerolling May be Pursued With Little or No Loss of Heat or Time

Lincoln "New Kathode" Welding Electrode

A welding electrode, known as the "New Kathode," has been developed by the Lincoln Electric Co., Cleveland, for the arc welding of mild steel and for cast iron repair work. It is manufactured in stock lengths of 14 in. and 24 in. To provide best possible protection, during shipment, the rod is packed in metal containers holding 50 lb. each.

Tapping Set-Up for Radiator Loop Machine

IN THE IRON AGE of June 27, page 1772, a new machine built by the Moline Tool Co., Moline, Ill., was described and illustrated. It is a single-purpose machine for boring, facing and tapping radiator loops. There are four spindles. The machine can be arranged to have all spindles boring and facing, or all facing and tapping, or half boring and half tapping. The illustration previously shown was of the machine as set up for boring and facing.

This same machine, adapted to facing and tapping, bores, taps and faces rough castings in one operation, the cycle being almost identical to that described before.

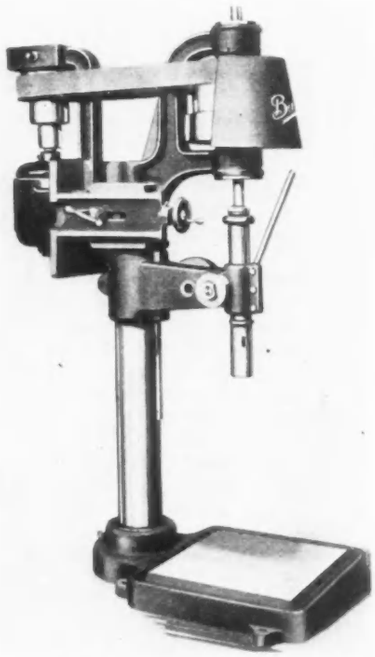
However, in this instance, the tapping is done by mechanical feed through a screw and nut having the same lead as the tap used for the work. The facing is done hydraulically and the cutters are mounted on the main spindles, while the taps are inserted in small spindles, operating through the center of large spindles, and are adjustable endwise, the same as the facing spindles.

In this latter case, one common drive motor is used, being mounted on the base, driving a common drive shaft through open and closed belts, so as to keep the timing correct.

Average production on this operation is 90 loops an hour. The machine can be adjusted to take any loop from 5 in. to 13 in. wide and from 8 in. to 38 in. between centers of holes. The approximate weight of the facing and tapping machine is 18,000 lb.

New 16-in. Sensitive Drill for Production Work

EQUIPPED with a ½-hp. motor the Buffalo Forge Co.'s, Buffalo, new 16-in. sensitive drilling machine here illustrated has capacity for drilling ⅞-in. holes in cast iron and 9/16-in. holes in steel. With a ½-hp. driving motor the capacity is ⅝ in. and 7/16 in. respectively. The drive is through three-step cone pulleys, providing three spindle speeds, 418, 835 and 1725 r.p.m.



Both Bench and Floor-Type Machines Are Made. With a 1725-r.p.m. motor, spindle speeds are 418, 835 and 1725 r.p.m.

In both the bench and floor type machines ball bearings are employed throughout. The head has a travel of 8½ in. and the spindle a travel of 7 in. The pulley and motor support is an iron casting and the column, which is 4 in. in diameter, is made of steel. The outer part of the spindle is guided by a sleeve running in bronze bearings and provided with a ball thrust bearing. Belt adjustment is made by loosening a hand-operated nut on the shifter bracket and turning the handwheel at the left-hand side of the machine. Hand-lever feed is provided on the bench machine and both hand-lever and foot-treadle feeds on the floor type drill. A knurled nut directly back of the feed pinion permits disconnecting the foot treadle at any time; or the foot treadle attachment can be omitted if desired.

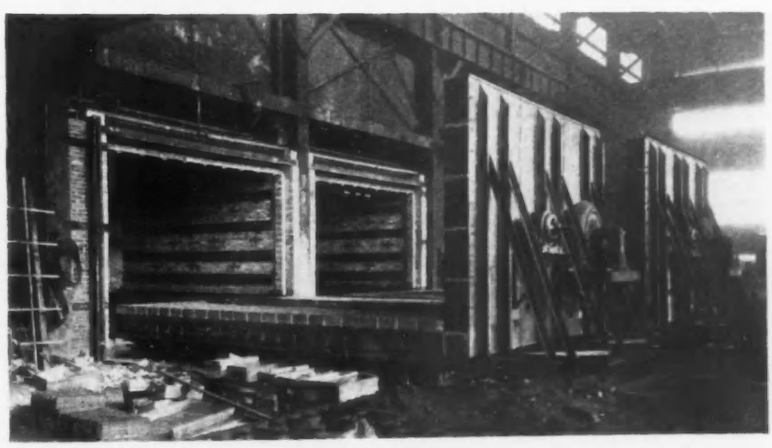
The floor type drill has a 12-in. square tilting table and a floor base 21 in. in diameter. The maximum distance from base to spindle is 46 in. and from table to spindle 38 in. The overall height of the machine is 76 in. The bench machine has a 15¾ x 22½-in. base, with a working surface 12¾ in. square. The greatest distance from table to spindle is 28 in. and the overall height of the machine is 48 in. The net weight of the bench drill is 350 lb. and of the floor type machine, 400 lb.

Annealing Furnace with Accelerated Cooling

THE General Electric Co. announces a new electric furnace for annealing alloy steel to obtain variable heating and cooling cycles.

The furnace is lined with lightweight refractories of low thermal capacity. By the use of this type of refractory it is possible for the furnace walls to heat or cool very quickly, serving to give flexibility to the heating and cooling cycles and to increase the furnace economy.

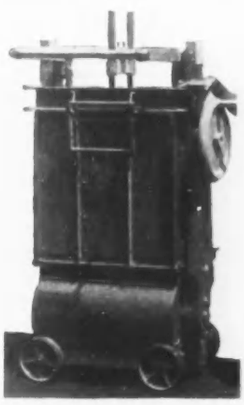
To obtain variation of the cooling period, cooling coils and a ventilating system that can be sealed tight by insulated doors during the heating period are used. The coils may be installed in the sides, bottom or both of the furnace. None of the cooling air enters the furnace chamber. The rate of cooling is varied by varying the amount of air blown through the ventilating system. The ventilation holes are fitted with sand-sealed, insulated covers to prevent heat leakage during the heating cycle. After the work is cooled by the cooling coils below the critical temperature, the covers may be opened and the cooling further accelerated by a flow of air into the bottom vents, through the furnace and out through the top vents. The covers may be opened to any extent by the use of a single control.



Uniform Heating, at Variable Speeds, and Control of Cooling Rate Are Features of This Electric Annealing Furnace

Small Scrap Bundling Press Has Motor Drive

PRODUCTION is markedly increased and denser bundles are made by an improved model small hydraulic scrap bundling machine which has been placed on the market by Samuel H. Garrett, 224 North Thirteenth Street, Philadelphia. The machine is designated as the Tempus No. 5 and is similar to the hand-operated press of the same name described in THE IRON AGE of Feb. 21, except that hand operation is now by means of sprocket and chain instead of by lever, and the hydraulic pump is motor driven instead of hand operated. An automatic starter stops the machine when the power limit is reached, and push button control is provided. The motor has Timken roller bearings packed with grease; other bearings are oiled automatically through hollow steel shafts that are filled from the outside and are protected by dust-proof spring valves.



Motor-Driven Pump Speeds Operation and Makes Possible Denser Bundles

Portable mounting is provided, as before, so that the machine may be moved conveniently to the scrap pile. Bundles 12 in. wide, 20 in. long and from 12 to 18 in. high, may be made, the height, as well as the weight of the bundle, being dependent upon the material. The height to top of the hopper is 40 in., the width 24 in. and the depth, front to back, 16 in. The weight of the new machine is 600 lb.

Metals Section of Safety Council Plans Meeting

The Metals Section of the National Safety Council will hold a meeting in connection with the eighteenth annual congress of the council at the Stevens Hotel, Chicago, Sept. 30 to Oct. 4. The program includes addresses by Dr. Harry Myers, superintendent of personnel, Frigidaire Corporation, Dayton, Ohio; George Seyler, works manager Lunkenheimer Co., Cincinnati; Phillip Stremmel, general superintendent Granite City Steel Co., Granite City, Ill.; H. S. Smith, Union Carbide Co., New York; and J. E. Culliney, safety engineer Bethlehem Steel Corporation, Bethlehem, Pa. F. G. Bennett, safety director Buckeye Steel Castings Co., Columbus, Ohio, and J. M. Woltz, safety director Youngstown Sheet & Tube Co., Youngstown, Ohio, will make reports of the foundry research committee and the safe practices committee, respectively.

At the final session a safety playlet will be presented and the iron and steel safety contest trophy will be awarded. John A. Oartel, chief of saftey bureau Carnegie Steel Co., will show a film illustrating safety kinks in the metals industry.

Pittsburgh Steel Foundry Acquires Sharon Company

The Pittsburgh Steel Foundry Corporation, Pittsburgh, has bought the Sharon Foundry Co , Sharon, Pa., and the Pittsburgh company is expected to issue 30,000 additional shares of common stock to finance the purchase.

The Pittsburgh Steel Foundry Corporation operates a plant at Glassport, Pa., and its products include steel castings, alloy steel castings, finished castings for rolling mill machinery, charging boxes and ingot cars, railroad bolsters and side frames, annealing boxes, and miscellaneous car and machinery castings. The Sharon company, with works at Wheatland, Pa., manufactures castings for steel works and blast furnaces and general machinery castings.

Exports of $1,000,000 a Day in Industrial Machinery

WASHINGTON, Aug. 6.—The upward trend of exports of industrial machinery, under way for the past six years, continues, and for the first half of 1929 their total value was nearly $130,000,000, as compared with $102,000,000 for the corresponding period of 1928, according to L. J. Cochrane, Industrial Machinery Division, Department of Commerce. The movement for the first six months of the present year approximately equaled the volume for the entire year of 1924 and considerably exceeded the volume for either 1922 or 1923.

Mr. Cochrane pointed out that industrial machinery exports are approaching a level of almost $1,000,000 each working day, "obviously a trade of very substantial importance when measured simply in terms of its monetary value, but of even greater importance if we remember the economic significance of machinery and the forces that the employment of this equipment will release in the countries of destination, whether this be highly specialized machinery for advanced industries of Europe or construction and other machinery that may be employed in some of the more backward territories."

New Pricing Basis for Steel Windows

Manufacturers of solid section steel windows have formulated a code of approved practices to be submitted to the Federal Trade Commission through their attorney, Abram F. Myers, formerly of the commission. The code is designed to eliminate unfair methods of competition, and uneconomic trade practices and to cooperate with the United States Department of Commerce in bringing about standardization and elimination of waste.

One of the principles most interesting to contractors is concerned with the elimination of discriminatory prices through publication by each company of its discounts from a standardized list price.

In accordance with this principle, the Detroit Steel Products Co., maker of Fenestra products, has authorized the following discounts as of Aug. 1:

On Engineering Products

Orders listing	*Discount per cent*
$0 to $400	45
$400 to $1,000	50
1,000 to 2,000	50 and 5
2,000 to 3,000	50 and 10
3,000 to 6,000	50 and 15
6,000 to 10,000	50 and 20
10,000 to 20,000	50 and 25
20,000 & Over	50 and 30

On Commodity Products

0 to 300	List
300 to 500	10
500 to 1,000	15
1,000 to 2,000	20
2,000 & Over	25

Imports of Pig Iron Into the United States by Ports of Entry

(In Gross Tons)

	12 Months Ended June	
	1929	1928
Massachusetts	15,297	14,478
Connecticut	8,255	3,100
Buffalo	40	.....
New York	8,594	7,118
Sabine	1,690	.....
Philadelphia	63,439	83,370
Chicago	2,000	2,150
Maryland	12,970	10,842
New Orleans	200	.....
Virginia	1,003	2,041
Galveston	1,441	2,370
San Antonio	395	245
Los Angeles	7,649	8,091
San Francisco	12,435	8,714
Oregon	547	1,212
Washington	1,139	2,313
Michigan	1,068	414
St. Louis	45	135
Hawaii	603	1,001
Total	138,810	147,594

Leetonia Furnace to Resume Under Belgian Process

The blast furnace formerly operated by the McKeefrey Iron Co., at Leetonia, Ohio, has been purchased by Morris B. Abrams, Cleveland, who is forming a company to operate the stack. Mr. Abrams says that associated with him will be a Belgian steel maker and a new process will be employed to allow the use of a much larger percentage of scrap than the maximum ordinarily used in blast furnace operation. It is the intention to use 75 per cent scrap and 25 per cent ore.

The McKeefrey furnace, first built in 1866, has been idle for a number of years. Several years ago plans were made for the erection of a steel plant in connection with the furnace, but were abandoned after steel for four 70-ton open-hearth furnaces had been delivered to the site. Mr. Abrams' plans include the building of these furnaces. The company that operates the furnace will be a subsidiary of the Atlas Steel & Supply Co., Cleveland, dealer in scrap, of which company Mr. Abrams is president.

Steel Fabricators to Meet at Biloxi

The next annual convention of the American Institute of Steel Construction, Inc., will be held in Biloxi, Miss., at the Edgewater Gulf Hotel, Nov. 13 to 16 inclusive. The institute has been invited by the German Steel Syndicate (Stahlwerks-Verband) to participate in an international conference on steel construction, to be held at Düsseldorf in August, 1930.

German Rebate on Pig Iron Expected to Be Continued

WASHINGTON, Aug. 6.—The Roheisen Verband, the German pig iron association, is expected to continue granting rebates to German consumers of pig iron for the second half of the present year, according to a report received by the Department of Commerce from Berlin. Under the association's contract with German consumers, the rebates on pig iron used in gray iron and malleable iron castings for export is equal to the difference between the domestic and world market prices. The rebate, which at the present time is fixed at about $1.43 per ton, is given only to those who buy 100 per cent of their requirements through the association.

Civil service examinations for engineers to fill vacancies in the Bureau of Standards, Department of Commerce, have been announced. Applications to the United States Civil Service Commission, Washington, must be made before Sept. 11. The positions to be filled include materials testing engineer and assistant testing engineers.

Europe Looks for September Upturn

Large Autumn Requirements Are Expected, but Steel Prices at Moment Are Weak—American Tin Plate Exports Active

(*By Cable*)

LONDON, ENGLAND, Aug. 6.

IRON and steel markets are under the influence of the holidays and little important change is expected before September. The Cleveland pig iron outlook is bright, as furnace output is well sold and preparations are on foot to relight more furnaces. Autumn requirements are expected to develop on a large scale.

Coke and ore shortage, and high prices are still the crux of the whole position.

Steel is quiet, especially in plates and sheets and rail sections. Mills are moderately active, but new business is slow, though shipbuilding specifications are issued more regularly.

Tin plate is quiet, with a steadier tone on small output. Works are closed for stopweek, which in several cases may be prolonged for two weeks. The quota percentage is expected to be further reduced.

Galvanized sheets are dull, but steadier, as production is restricted. Japan is inquiring for thin black sheets.

Clyde shipbuilding in July amounted to 13 vessels, or 38,000 tons.

Continental iron and steel are practically idle here. Prices generally are easy, but opinion is inclined that values have now touched their lowest.

French output for June was 865,000 metric tons of pig iron and 797,000 tons of steel.

German rolled steel output in June was 986,000 tons.

Polish production in June was: Pig iron, 58,000 metric tons; raw steel, 107,000 tons; rolled steel, 78,000 tons.

Continental Improvement Expected Soon

(*By Radio*)

BERLIN, GERMANY, AUG. 5.

MANY steel mills are beginning to show a decided unwillingness to accept export orders at present prices. The recent weakness in Continental prices is generally believed to be the result of the holiday season and recovery of the market is expected by the end of August.

All syndicate domestic prices are unchanged for this month. The home market is more active and there is an increasing demand for pig iron from foundries, machinery manufacturers and other consumers. Demand for gas and boiler tubes is improving. Except for pig iron, export prices are weaker and the Stahlwerksverband has made a further reduction in prices of bars, beams and bands.

Export Inquiry for Tin Plate Active

NEW YORK, Aug. 6.—Export inquiry for tin plate is active with the Nippon Oil Co. in Japan inquiring for quarterly requirements expected to total about 45,000 base boxes of oil sizes, and the Amtorg Trading Corporation, New York, asking for 60,000 to 75,000 base boxes of tin plate for export to Russia, shipment to begin in September. The Imperial Japanese Army is in the market for its annual requirement of canning tin plate, asking for about 10,000 base boxes, instead of the usual tonnage of 5000 to 7000 base boxes.

German Barbed Wire Sales Steadily Declining

HAMBURG, GERMANY, July 22.—Producers of barbed wire report a decline in consumption of this type of wire for fencing, a trend that has been particularly noticeable this year. Investigation by the mills shows that users apparently prefer galvanized fencing wire, wherever the substitution is possible. A similar trend in demand has been noticed in export business. As producers of barbed wire doubt that much increase would develop from advertising its use in Germany and abroad, it is believed probable that the barbed wire divisions of certain makers in the Ruhr will soon suspend operations. Mills here do not believe that so sharp a recession in barbed wire business will be experienced by American producers, as it is pointed out that the difference in price between barbed wire and galvanized fencing wire is much smaller in the American market than in Europe.

British and Continental European Export prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at $4.85

British Prices, f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3	12½s.	to	£3	13½s.	$17.58	to	$17.82
East Coast Hematite	3	15	to	3	15½	18.18	to	18.30
Ferromanganese, export	13	10	to	14	0	65.47	to	67.90
Billets, open hearth	6	7½	to	6	10	30.92	to	31.52
Sheet bars, open hearth	6	5	to	6	10	30.31	to	31.52
Black sheets, Japanese specifications	13	0	to	13	5	63.05	to	64.26
Tin plate, per base box	0	18¼	to	0	18½	4.42	to	4.48
Rails, 60 lb. and heavier	7	15	to	8	15	37.59	to	42.43
						Cents per Lb.		
Steel bars, open hearth	7	15	to	8	10	1.67	to	1.84
Beams, open hearth	7	2½	to	7	12½	1.55	to	1.65
Channels, open hearth	7	7½	to	7	17½	1.60	to	1.71
Angles, open hearth	8	2½	to	8	12½	1.76	to	1.86
Ship plates, open hearth	7	12½	to	8	2½	1.66	to	1.76
Black sheets, No. 24 gage	10	5	to	10	10	2.21	to	2.27
Galvanized sheets, No. 24 gage				13	7½			2.94

Continental Prices f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3	9s.	to	£3	13½s.	$16.73	to	$17.82
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3	11				17.21		
Billets, Thomas	4	18	to	5		23.76	to	24.25
Sheet bars, Thomas	5	1	to	5	2	24.50	to	24.74
Wire rods low C., No. 5 B.W.G.	6	4	to	6	6¼	30.06	to	30.61
Black sheets, No. 31 gage, Japanese	12	10				60.62		
Rails, 60 lb. and heavier	6	10*				31.52		
Rails, light	6	1½				29.46		
						Cents per Lb.		
Steel bars, merchant	5	13	to	5	14	1.25	to	1.27
Steel bars, deformed	5	12	to	5	12½	1.21	to	1.22
Beams, Thomas, British standard	5	4	to	5	6	1.12	to	1.14
Channels, Thomas, American sections	5	15	to	6	0	1.27	to	1.32
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	5	5				1.14		
Angles, Thomas, 3-in.	5	15				1.25		
Ship plates, open-hearth inspected	7	10				1.62		
Hoop and strip steel, over 6-in. base	5	15	to	5	17½	1.25	to	1.27
Wire, plain, No. 8 gage	7	7½				1.62		
Wire, galvanized, No. 8 gage	9	7½				2.02		
Wire, barbed, 4-pt. No. 12 B.W.G.	11	17½				2.56		
Wire nails, base	0	7¾				$1.87 per keg		
Wire nails, assortments, 1 to 6-in. keg	10	6½				2.23		

*Open-hearth steel, 10s. ($2.42) per ton extra.

Germany Exports Larger Part of Its Steel Output

HAMBURG, GERMANY, July 22.—The percentage of German steel production exported is increasing. Semi-finished steel exports represented 41.33 per cent of output in 1927, 57.37 per cent in 1928 and 51 per cent in the first half of this year. Structural steel exports were 17.6 per cent of production in 1927, 27.02 per cent in 1928 and 41.6 per cent in the first half of 1929. Foreign shipments of steel bars and rods were 19.7 per cent in 1927, 25.19 per cent in 1928 and 39.6 per cent in the first half of this year. Plate exports represented 25.8 per cent of output in 1927, 24.19 per cent in 1928 and 39 per cent in the first half of 1929. Shipments of steel hoops advanced from 19.7 per cent of output in 1927 to 25.02 per cent in 1928 and to 42.8 per cent in the first half of this year.

The proportion of production shipped for export is expected by some mills to show a decline during the second half.

Association of British Tin Producers in Prospect

WASHINGTON, Aug. 6.—Efforts are still being made by a British group to effect more active and centralized control of tin production and prices through the formation of a tin producers' association, according to a report received by the Department of Commerce from London. Actual progress in the organization of a comprehensive association is probably less than would appear to be indicated by some published reports, as there is understood to be considerable opposition. Strong financial interests are reported behind the proposals, however, and the ultimate formation of an association is expected.

It is apparently the opinion of a large section of the trade that, even if the plan should be successful, strict control would be difficult and in any case considerable time would elapse before its effects would be felt to any extent. This opinion, the report says, tends to be confirmed by the existing belief that production still exceeds consumption to a greater degree than is apparent from the available statistics of the industry.

Magnesium Alloy Cheaper Than Aluminum Alloy

HAMBURG, GERMANY, July 22.—Price reductions on Electron (magnesium alloy) have brought it to a lower price level per square meter than aluminum alloy. By way of comparison, the alumium alloy known as Lautal weighs 2.8 kg. per square meter in a No. 20 gage sheet and costs 12.75 m. ($3.03). Electron weighs 1.82 kg. per square meter for a No. 20 gage sheet and costs 11.83 m. ($2.83). These prices compare with 23.75 m. ($5.65) for a square meter of No. 20 gage copper sheet weighing 8.9 kg.

A recent publication of the German aluminum industry in commenting on the increasing use of aluminum and its alloys states that German consumption of copper in the first half of this year was about 20,000 tons less than in the first half of 1928, while consumption of aluminum and its alloys and other non-ferrous metals increased 29,000 tons.

German Koppers Company Has Large Contracts

HAMBURG, GERMANY, July 22.—Recent large foreign contracts for coke oven installations have been booked by the Heinrich Koppers A. G., Essen, which is affiliated with the Koppers Coke Oven Co., Sheffield, England, and the Koppers Co., in the United States. Among these contracts is an order from the Kabushiki Kaisha Asano Zosensho of Kanagawa for an installation of ovens that will be the largest in Japan. The company also has contracts for coke ovens in Czechoslovakia, Austria, Poland, India and Switzerland and, in addition, will modernize the entire coke production of the city of Stockholm, Sweden.

Earnings of Steel Companies Are Large

The Wheeling Steel Corporation reports net profit for the second quarter of $2,342,294, after all charges, equivalent to $4.25 a share on 394,837 shares of common stock. This compares with $1,795,243, or $2.86 a share, in the preceding quarter, and $1,530,125, or $2.19 a share in the second quarter of 1928.

For the second quarter the Pittsburgh Steel Co. had a net profit of $1,422,548, equivalent, after all charges, to $4.89 a share on 253,500 shares of common stock. Its first quarter earnings were $1,333,661, or $4.54 a share.

The American Rolling Mill Co. in the first six months of 1929 reports a surplus of $4,410,177, after interest, Federal taxes and preferred dividend requirements, equal to $3.26 a share on 1,351,379 shares of common stock (par value $25). This compares with surplus, excluding $2,785,918 income from sale of gas rights, of $1,767,001, or $1.55 a share on 1,140,022 shares in the first half of 1928.

Net profits of American Steel Foundries in the first half were $2,802,224, equivalent, after all charges, to $2.59 a share on 993,020 no-par value shares of common stock. In the same period last year net profits were $1,854,741, or $1.71 a share, on 902,745 shares.

In the second quarter the Inland Steel Co. earned a net profit of $3,126,908, after deducting all charges. The company's net profits in the entire year 1928 were $9,334,297.

Net income of Transue & Williams Steel Forging Corporation for the quarter ended June 30 was $137,603, before Federal taxes, equal to $1.37 a share on 100,000 no-par value shares outstanding. This compares with $132,534, or $1.32 a share, in the corresponding quarter of 1928.

In the first half of the year, net earnings of the Columbia Steel Corporation were $716,758, as against $329,938 in the same period last year. This is equivalent to 48c. a share on 1,497,171 shares of common stock, as against 23c. a share in the first six months of 1928 and about 57c. a share on 1,330,623 shares for the full year of 1928.

Imports of Pig Iron Into the United States by Countries of Origin

(In Gross Tons)

	12 Months Ended June	
	1929	1928
Belgium	204	651
France	131	3,000
Germany	703	1,495
Netherlands	30,948	26,874
Sweden	2,693	1,996
Norway	2,435	91
United Kingdom	41,839	45,213
Canada	1,108	414
Mexico	395	245
India	58,079	67,615
British Malaya	275	.....
Total	138,810	147,594

Iowa College Aids Graduates

To assist in solving the problem of securing business positions for engineering graduates, the personnel office of the division of engineering of Iowa State College, Ames, Iowa, published for the senior students a "personnel service leaflet," 3¾ x 6¾ in., punched to fit a standard loose-leaf cover. The leaflet shows a half-tone print of the student and gives his name, course, date of graduation and information regarding his qualifications. These leaflets are being sent to business firms throughout the country.

For use with drum switches mounted in crane cabs and similar places, the General Electric Co. announces a new type of operating mechanism. This mechanism, superseding the rack-and-pinion under-lever type, eliminates the trouble experienced in keeping a perfect line-up between the shaft of the operating mechanism and the drum switch shaft, and makes it possible to inclose the mechanism to keep dirt from the gear lubricant.

Jenison Machinery Co., 58 Fremont Street, San Francisco, has been appointed exclusive representative for northern California and parts of Nevada and Oregon for J. A. Fay & Egan Co., Cincinnati, manufacturer of woodworking machinery.

This Issue in Brief

Apprentice-training class work is carried on after regular work hours. Instructors are employees occupying responsible positions with the company, but certified to by the State Department of Education. One-half their salary as instructors is paid by the company, and one-half by the State. —Page 334.

* * *

Wrought iron made by Aston process discussed by inventor, who says the product is more uniform in quality through controllability of operations and elimination of individualism.—Page 344.

* * *

Defective castings resulting from use of deformed cores are virtually eliminated when ram-up cores are used, as the ram-up core, if deformed, will not fit properly into or against the pattern.—Page 347.

* * *

Creep stress investigation at high temperatures is handicapped by difficulty of getting exact measurement of minute deformations. Deformation may be proceeding at a rate so slow as not to be observed even with the most delicate measurement, except over the longest period of time.—Page 348.

* * *

Almost one million dollars worth of industrial machinery is exported per working day. Although of substantial monetary importance, the economic significance is even greater, considering the forces of employment the equipment will release in the countries to which the machinery is shipped.—Page 354.

* * *

Many machining operations required on master connecting rod for aircraft engine. Forgings are bored, reamed, drilled, milled and ground. Pickling in an alcohol solution containing 5 per cent nitric acid reveals cracks and surface flaws.—Page 337.

New puddleless wrought iron process is performed by pouring Bessemer steel gradually into a "cup" partly filled with iron silicate slag. The boiling action causes the steel to intermingle with the slag, producing a spongy mass of metal. The ball is compacted into a bloom under a hydraulic press.—Page 342.

* * *

Skilled labor problem is solved, partly at least, by apprentice-training course. Ohio machinery builder finds that he has an opportunity to determine at close range the apprentices' ability to fill future positions.—Page 334.

* * *

New process produces manganese sinter from low-grade silicious ore. Ammonia sulphate proves to be an effective solvent. One ton of manganese sinter of 67.3 per cent manganese can be made from 5.2 tons of ore.—Page 345.

* * *

High-strength structural steel reduces deadweight of ships' hulls 10 per cent. High elastic steel is gaining in use in British shipyards. In several vessels on order one-half the total weight of the steel will be high-elastic limit mild steel.—Page 345.

* * *

Ram-up cores cut foundry costs where castings have nozzles, projecting flanges and other irregularities. Advantages over a core placed in a core print are absence of fins, variation of metal and of misplaced cores.—Page 346.

* * *

Is the trend of new steel-producing capacity toward greatest consumption centers rather than toward sources of supply, as formerly? Growing importance of Michigan as a steel-producing State indicates that producers are getting close to customers. Freight today plays a large part in the expense of comparatively long hauls of finished steel.—Page 351.

Valuable information for engineers and designers of machinery and other steel structures is furnished by time-yield method of determining creep stress under high temperatures. Method developed in a British laboratory completes a test in three days.—Page 349.

* * *

Machinery builder now has no difficulty in securing applicants for his apprentice-training course. Several years ago applicants were scarce due to desire for immediate higher wages. Favorable publicity has helped. Vocational departments of local public schools produce the largest proportion of apprentices.—Page 336.

* * *

Lowered production costs of wrought iron, brought about by new process which eliminates hand-puddling, is expected to create expanded market for this metal. New plant will produce at the outset 600 gross tons per day. —Page 344.

* * *

Mergers as a whole do not operate more economically than independent companies. Recent study made by the National Industrial Conference Board revealed that the combined record of mergers over a term of years does not differ much from that of independents.—Page 358.

* * *

Mild steel used for high-pressure boiler drums may be stressed with safety to two-thirds the value of limits developed in British laboratory test. Time-yield value determines the maximum stress which can be imposed without change of dimensions.—Page 349.

* * *

Pig iron average daily output rate for July was 1.5 per cent under June. Average daily production was 122,100 tons, a new high record for July. On Aug. 11 there were 216 furnaces in blast, a loss of 2 for the month.—Page 362.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Still an Uneven Prosperity

EVERY one recognizes that there are varying rates of trade activity at the present time, some lines doing extremely well, others less well, and some rather poorly. It is worth while to inquire what general principles if any are involved. Then there is the particular point that some lines should not be expected to grow as fast as others, and their slower growth should not be held against them.

Turning to the conveniently arranged statistics compiled by the Federal Reserve Board, one finds that petroleum refining and automobile and tire production have been running this year far above the general activity, tobacco and iron and steel somewhat above, and leather and shoes and lumber far below.

There is a lack of perspective in much of the current comment. One of the commonest remarks in business conversations is that building activity is off this year. So it is, from last year; but this longer range and more impressive comparison, taking 1923-4-5 as the base period (which is used in all these Federal Reserve statistics), show that building contracts in the first five months of this year made a greater gain than industrial production, building contracts standing at 123 against 120 for industrial production. We therefore may dismiss building from present consideration, since by a reasonably long range comparison it is doing quite well enough, and study the details of industrial production.

In the first five months of this year industrial production (adjusted for seasonal variation) showed 20 per cent gain over the base period 1923-4-5. Manufacturing did better than mineral production, which is included in the general result, but with a relatively low weighting.

Taking the first five months of the year and comparing individual lines with the general industrial pace, we find the following divergences above and below, which for convenience are arranged in sequence:

Manufacturing

	Per Cent Variation		Per Cent Variation
Petroleum refining	+36	Cement, brick, and glass	+ 7
Automobiles	+30	Paper and printing	+ 5
Rubber tires	+29	Textiles	— 2
Tobacco and manufactures	+12	Food products	—17
Iron and steel	+10	Leather and shoes	—18
Non-ferrous metals	+ 9	Lumber	—30

Mineral Production

Copper	+14	Bituminous coal	—16
Crude petroleum	+13	Anthracite	—20
Lead	— 4	Silver	—20
Zinc	— 7		

Some questions are suggested by the table. Should one expect the output of food products to increase when production of automobiles increases? Food is 17 per cent below the general level of activity; the actual production was precisely the same as in the base period, but there was a trifle less food per capita, as population increased 6 per cent. Substantially the same thing can be said of coal, actual production showing no change. The difference is that one would not expect people to eat more when there is more manufacturing, but would expect the manufacturers to use more coal. This they avoid by utilizing coal more efficiently.

It is an interesting point that, while the increases from the base period in industrial production and in building are substantially the same, cement, brick and glass are 7 per cent above the general industrial average, while lumber is 30 per cent below. We may accept this, at least tentatively, as indicating a permanent swing in the character of materials used in building work, particularly when we observe iron and steel also to be in excess. It is not necessarily a change in choice of material for the same class of building, for there may be, and indeed there is, a change in the choice of building. Year by year, of the total family housing provided, apartments increase in proportion and single dwellings decrease.

Size and Business Success

"EVERYTHING you have is the biggest in the world." This gibe at the American point of view, made in the writer's hearing by a Brazilian student at one of our universities, was telling as well as ironical. There may be need for these reminders that our penchant for big things has its weakness, even though we see it as inseparable from the imagination that created our great business organizations and our justly famed mass production methods.

Faith in size *per se* has real dangers. Many look on the outstanding success of the United States Steel Corporation as final proof of the benefits of broad industrial consolidation, ignoring factors that have made its career exceptional. The popular mind more and more turns to mergers as the short cut to profits. There is an increasing tendency to attribute unusual achievement to large-scale organization and to overlook the human equation.

Industrial organizations, no matter how excellent in scheme, demand more than ever a high quality of directing personnel. Mergers do not guarantee competent management. A recent study of consolidations by the National Industrial Conference Board shows that their combined record over a term of

years does not differ much from that of independent companies. While many merged organizations made high profits and grew in size, many failed and the majority fell short of conspicuous success. Then there is the mammoth Ford company, with ramifications covering the globe, to confute continuously the idea that large-scale industry and consolidation are synonymous.

We are in a time when the public needs more than ever to discriminate in evaluating big things, since popular participation in the securities markets is greater than ever before. To ignore the present ratio of earnings to stock values and to trust in consolidation for future returns is to support the most unsound speculation. Unless this attitude gives way to greater sanity, the swollen volume of stock market transactions, with its attendant strain on credit, may become a real threat to prosperity.

The Supply of Steel Salesmen

TAKING stock of the physical and financial resources of a corporation is a routine matter. It behooves a corporation to take stock also of its personnel resources. The steel industry as a whole needs to take stock of its supply of salesmen, with regard not so much to the quantity or number as to the quality.

Since 1923 the tonnage of steel produced has increased approximately one-third. But for its welfare the industry requires much more than one-third increase in these six years in sales ability or quality, for three principal reasons: 1. The number of orders relative to total tonnage has increased greatly. 2. The variety of products made has increased greatly. 3. Competition has increased greatly.

Is not the requirement in total sales ability practically measured by the continued product of the increase in tonnage and the three other factors? Having one-third increase in tonnage and assuming only one-third increase for each of the other three factors, the continued product is more than a tripling. Has the steel industry tripled the effectiveness or sum total of quality of its selling force in the last six years?

By no means is it a matter of mere number of salesmen. Doubtless many cases would be found of a company increasing the number of salesmen by more than one-third, but increasing the number carries with it the temptation to lower the average quality. It requires more men to cover the ground and the orders are smaller, hence the executive may feel the individual rating need not be so high.

Steel companies have done a great deal in training their salesmen as to both the methods of manufacture and the character of uses of their products. We raise no question here as to whether or not they have done enough. Granting for argument that they have, there remains the final and crucial test of all salesmanship, and that is getting the price. Getting the order is only one part of the transaction, a useless or even injurious part if the price is not right. Have the steel companies that have trained their salesmen in the technique of character and quality of steel given corresponding attention to training them in the technique of getting the price?

It is a well known fact that spells of price cutting do occur in some of the finished steel products, usually leading to lower prices all around. Frequently the executive asserts that the salesman is to blame. He was too eager to get the order; he believed too much of what the buyer said; or he acted without instructions. Who is to blame for that? It is inconceivable that such a blunder should be so frequently made, of the salesman doing something to displease his chief when trying to please him. In the matter of believing what buyers say, it would seem that training in respect to that factor should be considered highly desirable. As to the salesman acting without instructions, nobody will take that seriously.

Accordingly the matter of the sales resources of the steel industry divides itself into two parts—the number and quality of the salesmen and the number and quality of the executives who direct the salesmen. We raise no question as to the ability of individual executives or heads of sales departments, the question being whether there are enough men in authority to manage properly the sales activities of the aggregated producers of steel. It can be said today, as it was said by Mr. Schwab in his first presidential address before the American Iron and Steel Institute, that "the next great move of the steel industry must be the proper and economic distribution and selling of its product."

Synthetic Manganese Ore

ON page 345 is printed a description of the so-called Bradley process for beneficiating the manganese-bearing iron ores of the Cuyuna range, summarized from a much more detailed account recently appearing in *Engineering and Mining Journal*. The first public reference to this process was made at the Cleveland meeting (April, 1927) under the auspices of the American Institute of Mining and Metallurgical Engineers to consider the whole question of manganese supply for the American steel industry. Briefly, the ore must be ground in ball mills and roasted in a reducing atmosphere to make the manganese soluble. The manganese is then leached out with ammonium sulphate solution, the iron and silica filtered off, the manganese precipitated with ammonia gas (thus regenerating the leaching solution) and the manganese hydrate washed, dried and sintered into a high-grade oxide for the furnace.

At first glance the process seems hopelessly complex and expensive. Treatment of ore in a closed system of chemical digesters and precipitators, closed so tightly that ammonia gas will not escape, would seem to have many drawbacks. But it should be remembered that the Calumet & Hecla company in the Lake Superior district has been engaged for many years in the profitable leaching of old tailings with ammonia gas. Thousands of tons a day of this waste material is dredged out of a lake, where it has lain these many years, is ground in ball mills, concentrated in a preliminary way by conventional methods, then leached with ammonia solutions, and a high-grade copper reclaimed. The over-all cost of this cannot be very great, for only about 12 pounds of copper is recovered from each ton of tailing treated. This plant operated when copper was selling for 15 cents a pound, so the total cost must have been below $1.80 per ton.

Similarly it might be noted that the Kennecott

Copper Corporation leaches a mill tailing with ammonia. Approximately 25 pounds of copper is recovered from a ton of tailing and it must cost less than $3.75 per ton to do it.

It might be objected that these costs do not include mining, that the chemical processes have a crushed material delivered to them free of charge. Surface mining and crushing of Cuyuna ores would probably cost about as much as the same operation at Ajo, Ariz. At that place, the New Cornelia Copper Co. steam-shovels an oxidized copper ore, crushes it, leaches it with sulphuric acid, reduces the solution, makes an electrolytic cathode, sells the copper and pays the freight to Eastern seaboard for less than $3.80 per ton. (The company gets only 25 pounds of copper out of a ton of ore.)

Consequently it must be admitted that a well designed plant operating on an economical chemical cycle, where the solvent is regenerated, can handle the raw material for costs on the order of $4 a ton. Assuming that the Bradley process is such a one, and that it takes 5 tons of ore to make one ton of sinter (65 per cent manganese), the operation might cost approximately $20 when done on a large scale. This is close to the price during 1923 to 1927 of 50 per cent foreign ore at our ports, before the payment of the duty of 1 cent per pound of manganese.

Since 65 per cent sinter should command a sizable premium over 50 per cent ore, the financial chances for the proposed process, on the basis of these rough figures, seem bright. Unless, indeed, the miners of Russian and Indian high grade ores reduce their selling prices sharply.

Whether the Bradley process is as simple to operate as the ammonia or acid leaching of copper may be doubted. In the first place it requires a preliminary roast, closely controlled as to time, temperature and gas analysis, so that most of the manganese may be made soluble, without getting too much of the iron simultaneously into solution. In the second place, the final precipitate, manganese hydrate, is a dense flocculate, which settles slowly, and like iron and aluminum hydrates, is very hard to wash clean. Mr. Bradley says that aeration will deflocculate the material. This is to be hoped; otherwise the precipitate will carry off valuable ammonium sulphate solvent and the sinter will run too high in sulphur. If, on the other hand, too much water is used to wash the sulphate out, it must later be evaporated (with costly heat) to recover the chemical solvent.

Another latent source of trouble, which might easily loom bigger than either of the above, is the use of the same reaction to put the manganese into solution that is used later to precipitate it. In other words, it is one of those reversible reactions which works from right to left in one stage and from left to right in the second. Sometimes, however, with fiendish persistence, these work the wrong way, precipitating when they really should be leaching, and vice versa. Practical success with such chemical reactions requires continuously precise control of solution temperatures, concentrations and pressures—a thing not always possible when one of the raw materials varies as much in chemical composition and physical constitution as ore.

Summing up, it may be said that equally intricate hydro-metallurgical operations have long been carried out on a grand scale, using the same sort of equipment which the Bradley process requires, and at a cost which ought to be competitive. However, there seem to be chemical pitfalls which a commercial plant may not be able to avoid—although they appear to have been in the 4-ton pilot plant already operated.

THE IRON AGE desires to congratulate most heartily Wilson Bradley, his assistants and his backers, on the persistence, skill and faith which have brought them thus far toward their goal. If the chemical processes are not too delicate, if the stable ranges in the reversible reactions are sufficiently wide to lend themselves to commercial operations on hundreds of tons a day, the chances of success seem to be bright.

CORRESPONDENCE

British Requirements for Aircraft Tubing Are Exacting

To the Editor: In your July 25 issue the article entitled, "Metals Used in Airplane Making" has been read with a great deal of interest, but I feel that an important oversight was made in the statement: "Those who have European experience cling to a medium carbon seamless steel tube. It was the ordinary seamless tube which succeeded the fuselage of wood and is still used by many British and Continental makers."

The historical portion of the above quotation is probably correct, but present British practice does not use "ordinary seamless tube" in any vital parts of the fuselage. The specification used in places where United States practice employs S.A.E. No. 4130X (chrome molybdenum) is covered by Provisional Air Ministry Aircraft Specifications Number D.T.D. 89A and Number D.T.D. 113, the former covering all round tubes down to and including ½-inch diameter, and the latter all round tubes below ½-inch diameter, and all sizes of non-circular tubes.

The steel covered by these specifications is of the following approximate analysis, being directly quoted from copies of the specifications:

Carbon	not more than 0.30 per cent
Silicon	not more than 0.30 per cent
Sulphur	not more than 0.050 per cent
Phosphorus	not more than 0.050 per cent
Manganese	not more than 1.50 per cent

Specification No. D.T.D. 89A calls for the following physical properties:

Tensile strength before welding, min.	100,800 lb. per sq. in.
Yield stress before welding, min....	89,600 lb. per sq. in.
Tensile strength after welding, min..	67,200 lb. per sq. in.
Yield stress after welding, min.....	56,000 lb. per sq. in.

Specification No. D.T.D. 113 calls for the following physical properties:

Tensile strength before welding, min.	78,400 lb. per sq. in.
Yield stress before welding, min.....	67,200 lb. per sq. in.
Tensile strength after welding, min..	67,200 lb. per sq. in.
Yield stress after welding, min.....	56,000 lb. per sq. in.

This contrasts with the S.A.E. 4130X minimum ultimate strength of 55,000 lb. and yield point of 36,000 lb., as mentioned in your publication.

British aircraft engineers and metallurgists with whom I have talked pointed out the much higher yield point required by the British Air Ministry specifications, and also the much higher yield point obtainable by the use

AIRPLANE Float of Monel Metal and Monel Rivets

of this 1.50 per cent manganese tubing. They also claim that with the high manganese tubing there is no tendency to air harden at the weld as is the case with the chrome molybdenum specification, thereby causing brittleness in the joints.

It would seem that in the matter of aircraft tubing the British are more exacting than are our own people; and if these British specifications are of interest to any aircraft engineers we should be glad to supply them.

HENRY SEARS HOYT
A. Milne & Co.
745 Washington Street
New York

Metals Used in Airplane Construction

To the Editor: I read with considerable interest the very excellent article "Metals Used in Airplane Making" appearing in THE IRON AGE for July 25. I believe it would be of interest to add to the comprehensive list of metals discussed therein, the following additional metals and general observations:

Stainless steels, particularly of the non-magnetic type, are finding an ever increasing application in aircraft. These are highly desirable not only because of their corrosion resisting properties, but because where earth inductor compasses are installed the non-magnetic feature is highly desirable. They are applicable to all uses to which steel is applied in aircraft, and most recently they have been used for manufacturing airplane ribs by special brazing and welding processes. They are, of course, extensively used in British airship R 101.

Monel metal, 69 per cent nickel, 28 per cent copper, 2 per cent iron and 1 per cent manganese, silicon and carbon, though a heavy metal, combines strength with inherent resistance to corrosion—an important feature. Monel metal floats recently built do not exceed the weight of analogous duralumin floats by 10 per cent. It has been used for many other parts, and while still highly experimental in aeronautical applications, its use is being watched with keen interest.

Copper is used in sheet form for gas and oil tanks, radio bonding, radiator shells, shims and washers, and flashing on wooden hulls and floats. In tube form it is used for gas, oil and water lines, radiator cores and heater coils. For fuel systems it is rapidly regaining favor over the lighter aluminum and duralumin tubing. As wire, it is used for ignition, radio and lighting wires, for bonding and for safety wire. Of the many alloys, brass, bronze, etc., it will perhaps suffice to say that their employment in aircraft is analogous to their use in other products.

In considering the relative merits of materials of construction for aircraft use, the most important factor is the strength-weight ratio. The accompanying table gives the strength-weight ratio of some of the aircraft materials:

STRENGTH-WEIGHT RATIO OF AIRCRAFT MATERIALS

Material	Ultimate Tensile Strength, Lb. per Sq. In.	Specific Gravity	Index T. S. / S. G. x 1000
Music wire (0.01 in. dia.)	400,000	7.85	51.2
Alloy steel (extra high strength)	200,000	7.85	25.6
Magnesium alloy	34,000	1.75	19.4
Duralumin	55,000	2.85	19.3
Balsa wood (Comp.)	2,200	.12	18.3
Alloy steel (heat treated—generally used)	125,000	7.85	15.9
Monel metal (hard)	127,000	8.8	14.4
Spruce (Comp.)	4,300	.46	9.8
Monel metal (annealed)	82,000	8.8	9.3
Mild carbon steel (normalized)	55,000	7.85	7.0
Aluminum	18,000	2.7	6.7

JOHN F. HARDECKER
Chief Draftsman, Aircraft Factory,
United States Navy Yard,
Philadelphia.

Concrete Reinforcing Bars Tested

TO find a method of making the cold-bend test of uniform severity for concrete reinforcing bars of all sizes and degrees of hardness, and to find an impact test suitable for detecting brittleness in such bars, a series of tests have been made at the Bureau of Standards.

A standard test for quality of concrete reinforcing bars consists in bending the bars, without heating, through 90 to 180 deg. with a radius of bend equal to one, two or three diameters of the bar. The angle and radius of the bend depend generally upon the size and hardness of the bar. The differences in the angle and radius of the bend required for different types of bars cause differences in the severity of the tests applied to them. Thus the tendency is to suit the specification to what the bars of different grade will meet successfully, rather than to the service demanded of them in bending for use as reinforcement.

In the tests made by the Bureau of Standards, on bars purchased in the open market, it was desired to find out also whether the application of the cold-bend test might impair the tensile strength, although the bar did not fail in the bend test. Cold-bend tension and impact tests were made. The cold-bend tests were made by the standard methods and by means of an improved machine designed and built at the bureau.

Bars that did not break in the cold-bend test were not seriously affected as to strength by the bending. With the special bending machine used, all bars, regardless of their size, appeared to undergo about the same strain when bent through the same angle. The apparent yield point in the bending test was made higher than the yield point determined in direct tension test.

While the impact test used gave an approximate measure of the yield point of the bar, none of the bars broke in the impact test except a few which had been quenched in water from a high temperature.

New July Record in Iron Output

Daily Rate Less Than June by 1808 Tons or 1.5 Per Cent—New Seven Months' Record —Net Loss of Two Furnaces

A NEW record for pig iron production in July was made this year. Complete returns from every furnace show that the output was 122,100 tons per day. The next largest July was 118,656 tons daily in 1923. Compared with June, the July production fell off nearly 1.5 per cent. It was about 2.9 per cent under the record month in May.

Total output in July was 3,785,120 gross tons or 122,100 tons per day for the 31 days, compared with 3,717,225 tons or 123,908 tons per day for the 30 days in June. The June data are revised because telegraphic reports on July 2 were not in all cases complete. The July output shows a loss of 1808 tons per day from June or 1.46 per cent.

A New Seven Months' Record

For the seven months to Aug. 1, the production was 25,426,080 tons, which is a record. The best previous similar period was to Aug. 1, 1923, when the total was 24,519,868 tons. The war record for the first seven months was 21,423,660 tons in the year 1918.

Rate of Operation on Aug. 1

On Aug. 1 there were 216 furnaces blowing with an estimated operating rate of 121,965 tons per day. On July 1, according to revised data, there were 218 furnaces operating with an estimated operating rate of 122,590 tons each day. Only three

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1925—Gross Tons

	1925	1926	1927	1928	1929
Jan.	108,720	106,974	100,123	92,573	111,044
Feb.	114,791	104,408	105,024	100,004	114,507
Mar.	114,975	111,032	112,366	103,215	119,822
Apr.	108,632	115,004	114,074	106,183	122,087
May	94,542	112,304	109,385	105,931	125,745
June	89,115	107,844	102,988	102,733	123,908
½ year	105,039	109,660	107,351	101,763	119,564
July	85,936	103,978	95,199	99,091	122,100
Aug.	87,241	103,241	95,073	101,180	.....
Sept.	90,873	104,543	92,498	102,077	.....
Oct.	97,528	107,553	89,810	108,832	.....
Nov.	100,767	107,890	88,279	110,084	.....
Dec.	104,853	99,712	86,960	108,705	.....
Year	99,735	107,043	93,266	103,382	.....

Pig Iron Production by Districts, Gross Tons

	July (31 days)	June (30 days)	May (31 days)	April (30 days)
New York and Mass.	256,697	246,124	265,512	257,299
Lehigh Valley	95,571	102,302	108,803	93,506
Schuylkill Valley	71,350	70,265	74,312	69,684
Lower Susq. and Lebanon Valleys	37,775	44,651	33,392	31,150
Pittsburgh district	815,045	787,313	814,944	780,896
Shenango Valley	144,455	148,675	157,952	143,260
Western Pennsylvania	146,886	143,474	159,960	152,942
Maryland, Va. and Ky.	123,447	117,250	135,073	118,785
Wheeling district	127,136	133,450	147,933	142,470
Mahoning Valley	373,181	372,030	380,129	364,373
Central and North'n Ohio	387,383	374,138	388,958	318,678
Southern Ohio	52,232	46,345	47,635	44,139
Illinois and Indiana	772,276	771,070	795,902	768,307
Mich., Minn., Mo., Wis., Colo. and Utah	146,304	131,514	145,840	135,191
Alabama	225,513	219,235	235,117	235,787
Tennessee	9,869	9,389	6,620	6,158
Total	3,785,120	3,717,225	3,898,082	3,662,625

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
July, 1928	79,513	19,578	99,091
August	82,642	18,538	101,180
September	82,590	19,487	102,077
October	88,051	20,781	108,832
November	88,474	21,610	110,084
December	85,415	23,290	108,705
January, 1929	85,530	25,514	111,044
February	89,246	25,261	114,507
March	95,461	24,361	119,822
April	95,680	26,407	122,087
May	100,174	25,571	125,745
June	99,993	23,915	123,908
July, 1929	98,044	24,056	122,100

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

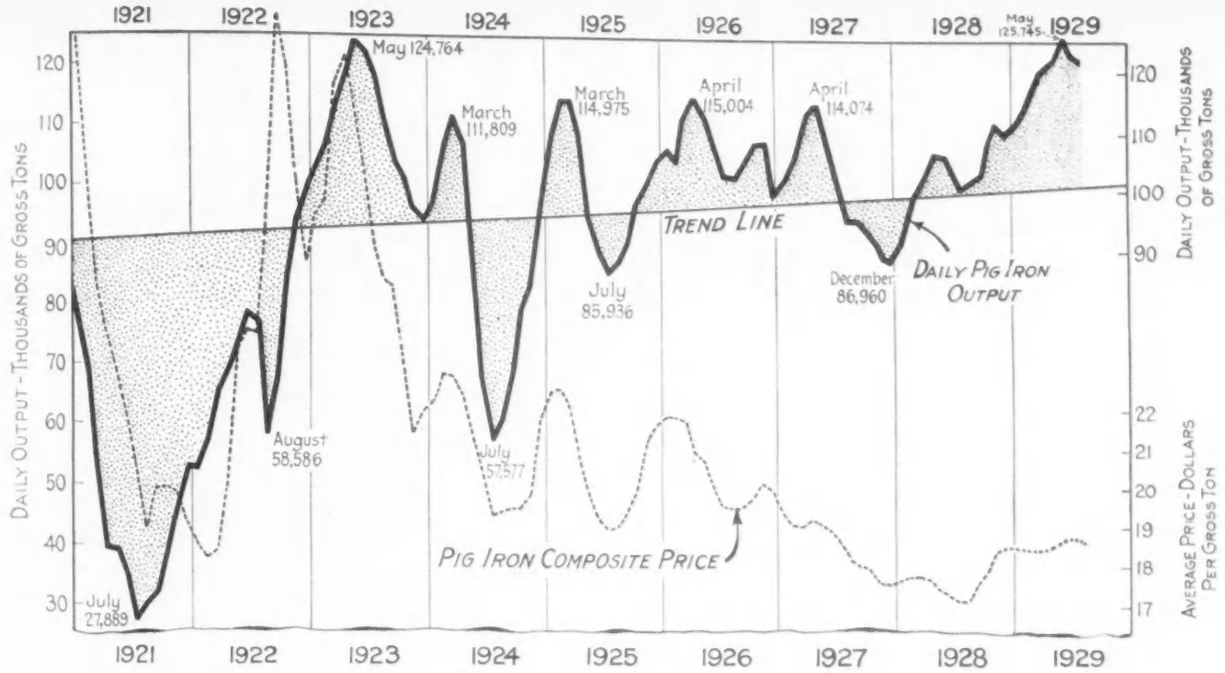
	Aug. 1		July 1	
Furnaces	Number in Blast	Gross Tons per Day	Number in Blast	Gross Tons per Day
New York:				
Buffalo	14	7,295	14	7,275
Other N. Y. and Mass.	3	980	3	930
New Jersey	0	....	0	....
Pennsylvania:				
Lehigh Valley	8	3,085*	8	3,410*
Schuylkill Valley	5	2,300	5	2,340
Susquehanna Valley	2	1,170	3	1,495
Ferromanganese	0	....	0	....
Lebanon Valley	0	....	0	....
Ferromanganese	0	....	0	....
Pittsburgh District	41	26,225	40	25,575
Ferromanganese	3	485	3	470
Shenango Valley	8	4,370	9	4,955
Western Pennsylvania	7	4,185	8	4,230
Ferromanganese	3	425	3	550
Maryland	6	3,345	6	3,075
Wheeling District	7	4,135	7	4,290
Ohio:				
Mahoning Valley	19	12,040	19	12,030
Central and Northern	20	12,495	20	12,470
Southern	4	1,700	3	1,545
Illinois and Indiana	35	24,915	35	25,105
Mich., Wis and Minn.	7	3,405	7	3,160
Colo., Mo. and Utah	3	1,315	3	1,225
The South:				
Virginia	0	....	0	....
Ferromanganese	1	90	1	90
Kentucky	1	420	2	745
Alabama	17	7,270	17	7,310
Ferromanganese	0	....	0	....
Tennessee	2	315	2	315
Total	216	121,965	218	122,590

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months Beginning Jan. 1, 1927—Gross Tons

	1927	1928	1929
Jan.	3,103,820	2,869,761	3,442,370
Feb.	2,940,679	2,900,126	3,206,185
Mar.	3,483,362	3,199,674	3,714,473
Apr.	3,422,226	3,185,504	3,662,625
May	3,390,940	3,283,856	3,898,082
June	3,089,651	3,082,000	3,717,225
½ year	19,430,678	18,520,921	21,640,960
July	2,951,160	3,071,824	3,785,120
7 mos.	22,381,838	21,592,745	25,426,080
Aug.	2,947,276	3,136,570	.....
Sept.	2,774,949	3,062,314	.....
Oct.	2,784,112	3,373,806	.....
Nov.	2,648,376	3,302,523	.....
Dec.	2,695,755	3,369,846	.....
Year*	36,232,306	37,837,804	.....

*These totals do not include charcoal pig iron. The 1928 production of this iron was 142,960 gross tons.



Production of Pig Iron in July Represented an Average Output per Furnace Close to 565 Tons

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 423,000 tons

furnaces were blown in during July while five were shut down.

No furnaces were blown in or blown out by the Steel Corporation last month, but independent steel companies blew in two and shut down three. There was one merchant stack blown in and two were blown out or banked. Thus the month's net loss was one steel-making and one merchant furnace.

Loss in Steel-Making Iron

There was a loss in the production of steel-making iron last month and a slight gain in merchant iron. The loss in steel-making iron was 1959 tons per day from June while the gain in merchant was 141 tons in the daily rate.

Second Largest Ferromanganese Output This Year

Production of ferromanganese at 31,040 tons was smaller than the 33,363 tons made in June, which was a record for many months. The July output was the second largest this year. The spiegeleisen output was normal.

Furnaces Blown In and Out

Only three furnaces were blown in during July: No. 2 Monessen furnace of the Pittsburgh Steel Co. in the Pittsburgh district, the Martins Ferry furnace of the Wheeling Steel Corporation in the Wheeling district, and the Globe furnace in southern Ohio.

Five furnaces were blown out or banked during July: One furnace at the Steelton plant of the Bethlehem Steel Corporation in the Susquehanna Valley, the Colonial furnace in western Pennsylvania, one Ashland furnace of the American Rolling Mill Co. in Kentucky, the Claire furnace in the Shenango Valley, and No. 1 LaBelle furnace of the Wheeling Steel Corporation in the Wheeling district.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron Spiegel and Ferromanganese			Ferromanganese*		
	1927	1928	1929	1927	1928	1929
Jan.	2,343,881	2,155,133	2,651,416	31,844	22,298	28,208
Feb.	2,256,651	2,274,880	2,498,901	24,560	19,320	25,978
Mar.	2,675,417	2,588,158	2,959,295	27,834	27,912	24,978
Apr.	2,637,919	2,555,500	2,826,028	24,735	18,405	22,413
May	2,619,078	2,652,872	3,105,404	28,734	29,940	25,896
June	2,343,409	2,448,905	2,999,798	29,232	32,088	33,363
½ year	14,876,355	14,675,448	17,040,842	166,939	149,963	160,836
July	2,163,101	2,464,896	3,039,370	26,394	32,909	31,040
7 mos	17,039,456	17,140,344	20,080,212	193,333	183,872	191,876
Aug.	2,213,815	2,561,904	.....	21,279	24,583	.....
Sept.	2,090,200	2,477,695	.....	20,675	22,278	.....
Oct.	2,076,722	2,729,589	.....	17,710	23,939	.....
Nov.	1,938,043	2,654,211	.....	17,851	29,773	.....
Dec.	1,987,652	2,647,863	.....	20,992	28,618	.....
Year	27,345,888	30,211,606	.....	291,840	312,061	.....

*Includes output of merchant furnaces.

Sale of Commonwealth Steel Co. Formally Closed

The sale of the Commonwealth Steel Co., Granite City, Ill., to the General Steel Castings Co., Philadelphia, has been formally closed. Deeds convey the Commonwealth properties to the Philadelphia corporation through an intermediary, John J. Dooher, a Commonwealth employee.

Sales department of Page Steel & Wire Co., Bridgeport, Conn., has been moved from Bridgeport to American Bank Building, Pittsburgh. Sales of chain link fence will be handled by R. T. Teeple, and field fence and general wire products by S. B. Cairns. Welding wire and specialties will be under direction of J. J. Flaherty. W. T. Kyle, general manager of sales, will be located in New York Central Building, 230 Park Avenue, New York.

Iron and Steel Markets

Rate of Pig Iron Production Dips

July Total Shows Gain, But Daily Average Declines 1.46 Per Cent From That of June—Smaller Steel Producers Curtail Operations

PIG iron production in July, at 3,785,120 tons, exceeded that of June by 67,895 tons, and was the third largest monthly total on record, being surpassed only by the figures for May, 1929, and May, 1923. However, the July daily rate of output, 122,100 tons, ranks fifth, having been exceeded by the months mentioned and by June, 1923, and June, 1929. The decline from the previous month, this year, was 1808 tons, or 1.46 per cent. The loss was entirely in steel making pig iron, the rate for merchant iron having shown a slight gain.

Pig iron production thus far this year, at 25,426,080 tons, has established a new seven months' record, surpassing the previous high mark, for the corresponding period in 1923, by nearly 4 per cent.

Continued high output this month is indicated by the rate at which the 216 furnaces in blast were operating on Aug. 1, namely 121,965 tons a day, or only 135 tons below the actual average production through July.

August production of steel seems to be pointed toward a decline of possibly 5 or 10 per cent from the recent high rate. Thus far makers of a wide range of products have been able to allocate tonnage among their various finishing departments in such a manner as to utilize their full ingot capacity, and there are indications that replenishment of reserve stocks of semi-finished steel will be a factor in sustaining their output through the remainder of the month. Such a move would place them in a position to take advantage of improved business in September and, at the same time, would permit them to continue to reap the economies accruing from peak operations.

Actual reductions in steel output to date have been confined to smaller companies specializing in a few finished products. Shifts in demand are less serious for producers making a diversity of finished materials, since a decline in business in one direction is frequently offset by a gain in another. The Steel Corporation, for example, continues to operate at virtually 100 per cent of capacity and its total backlog is still large.

Unquestionably buyers are ordering at closer range than earlier in the year. In fact, Pittsburgh reports that business in hot-rolled strip, tin plate, and cold-finished and alloy steel bars is again on a hand-to-mouth basis. This change in buying practice does not necessarily presage any marked change in operations or in the volume of consumption. Moreover, extended deliveries are still the rule on some of the heavier products, notably on plates, and in the Chicago district, favored by steel pipe and railroad car business, mill commitments seem headed for another period of expansion. The week's steel specifications at Chicago were the largest since late in April.

Railroad buying is featured by the placing of 30,000 tons of rails by the New York, New Haven & Hartford. The Chicago, Milwaukee, St. Paul & Pacific has entered the market for 1000 gondola cars, and the Pacific Fruit Express, for 500 refrigerator cars, raising the total of pending inquiries to 5000 cars, of which 4500 are freight and 500 passenger cars. The Pennsylvania Railroad will open bids Aug. 16 on 29,000 tons of plates, shapes and bars. Two Lake boats, placed by the Steel Corporation, call for 10,000 tons of plates and shapes.

Automobile production this month, judging by the announced schedules of motor car plants, will be larger than in July, but it is not expected to get back into full swing before October.

Fabricated steel awards, totaling 34,000 tons, are on a par with those of the previous week, and fresh inquiries aggregate 35,000 tons. The amount of pending work in the East is estimated as the largest on record.

Prices on wire nails have generally declined to $2.55 a keg, Pittsburgh or Cleveland, a recession of $3 a ton from the recent quotation of $2.70. Barbed wire has gone down in sympathy with nails, and in the New York district, plain wire has been sold at $2.40 a 100 lb., Pittsburgh, a concession of $2 a ton. On galvanized sheets 3.50c. a lb., Pittsburgh, is now the recognized market, a reduction of $2 a ton, and irregularities are reported on blue annealed and black sheets. On the other hand, several makers of cold-rolled strip have announced advances of $2 a ton to 2.85c. a lb., Cleveland or Pittsburgh.

Pig iron buying is not particularly active, but furnace shipments to foundries are keeping up at a good rate, with increased demand from makers of heating equipment tending to offset, in part, the reduced requirements of the automotive industry. Southern producers have sold 35,000 tons in the St. Louis district in the past month, but an eastern Pennsylvania steel plant which recently bought a barge load of Alabama iron, has divided an order for 18,000 tons of basic among nearby furnaces.

Domestic sales of copper, amounting to 30,000 tons for the week, were the largest since mid-March. Foreign orders for 12,000 tons were the best in several months. Consumers have been forced to come into the market after failing to break the price, which has remained at 18c., delivered Connecticut Valley.

THE IRON AGE pig iron composite price is again where it was two weeks ago, having advanced 4c. to $18.42 a gross ton. The finished steel composite remains at 2.412c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Aug. 6, 1929	July 30, 1929	July 9, 1929	Aug. 7, 1928
No. 2 fdy., Philadelphia	$21.26	$21.26	$21.76	$20.26
No. 2, Valley furnace	18.50	18.50	18.50	16.50
No. 2 Southern, Cin'ti	17.69	17.69	18.19	19.19
No. 2, Birmingham	14.50	14.50	14.50	15.50
No. 2 foundry, Chicago*	20.00	20.00	20.00	17.50
Basic, del'd eastern Pa.	*19.75*	20.00	20.25	19.00
Basic, Valley furnace	18.50	18.50	18.50	16.00
Valley Bessemer, del'd P'gh	20.76	20.76	20.76	18.76
Malleable, Chicago*	20.00	20.00	20.00	17.50
Malleable, Valley	19.00	19.00	19.00	17.00
Gray forge, Pittsburgh	19.76	19.76	19.76	18.01
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	105.00	105.00	105.00	105.00
Rails, Billets, etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	35.00	35.00	35.00	32.00
Sheet bars, Pittsburgh	35.00	35.00	35.00	32.00
Slabs, Pittsburgh	35.00	35.00	35.00	32.00
Forging billets, Pittsburgh	40.00	40.00	40.00	38.00
Wire rods, Pittsburgh	42.00	42.00	42.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90
Finished Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.95	1.95	1.95	1.90
Bars, Chicago	2.05	2.05	2.05	2.00
Bars, Cleveland	1.95	1.95	1.95	1.85
Bars, New York	2.29	2.29	2.29	2.24
Tank plates, Pittsburgh	1.95	1.95	1.95	1.90
Tank plates, Chicago	2.05	2.05	2.05	2.00
Tank plates, New York	2.22½	2.22½	2.22½	2.17½
Structural shapes, Pittsburgh	1.95	1.95	1.95	1.90
Structural shapes, Chicago	2.05	2.05	2.05	2.00
Structural shapes, New York	2.19½	2.19½	2.19½	2.14½
Cold-finished bars, Pittsburgh	2.30	2.30	2.30	2.10
Hot-rolled strips, Pittsburgh	1.90	1.90	1.90	1.75
Cold-rolled strips, Pittsburgh	2.75	2.75	2.75	2.90

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel,	Aug. 6, 1929	July 30, 1929	July 9, 1929	Aug. 7, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	*2.85*	2.85	2.85	2.65
Sheets, black, No. 24, Chicago dist. mill	3.05	3.05	3.05	2.75
Sheets, galv., No. 24, P'gh	*3.50*	3.60	3.60	3.40
Sheets, galv., No. 24, Chicago dist. mill	3.80	3.80	3.80	3.60
Sheets, blue, No. 13, P'gh	2.35	2.35	2.35	2.10
Sheets, blue, No. 13, Chicago dist. mill	2.45	2.45	2.45	2.20
Wire nails, Pittsburgh	*2.55*	2.60	2.65	2.55
Wire nails, Chicago dist. mill	2.65	2.65	2.70	2.60
Plain wire, Pittsburgh	2.50	2.50	2.50	2.40
Plain wire, Chicago dist. mill	2.55	2.55	2.55	2.45
Barbed wire, galv., Pittsburgh	*3.20*	3.30	3.30	3.20
Barbed wire, galv., Chicago dist. mill	3.35	3.35	3.35	3.25
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$18.75	$18.75	$18.50	$15.00
Heavy melting steel, Phila	16.50	16.50	16.50	13.00
Heavy melting steel, Ch'go	14.75	14.75	14.75	12.75
Carwheels, Chicago	14.00	14.00	14.00	12.75
Carwheels, Philadelphia	16.50	16.50	16.50	15.50
No. 1 cast, Pittsburgh	15.50	15.50	15.50	14.25
No. 1 cast, Philadelphia	16.50	16.50	16.50	15.50
No. 1 cast, Ch'go (net ton)	14.50	14.50	14.50	13.50
No. 1 RR. wrot., Phila.	16.00	16.00	16.00	13.50
No. 1 RR. wrot., Ch'go (net)	13.50	13.50	13.50	10.75
Coke Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$2.75	$2.75	$2.75
Foundry coke, prompt	3.75	3.75	3.75	3.75
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	18.12½	14.75
Electrolytic copper, refinery	17.75	17.75	17.75	14.50
Tin (Straits), New York	47.25	47.25	45.12½	47.87½
Zinc, East St. Louis	6.80	6.80	6.70	6.25
Zinc, New York	7.15	7.15	7.05	6.60
Lead, St. Louis	6.55	6.55	6.70	6.00
Lead, New York	6.75	6.75	6.90	6.20
Antimony (Asiatic), N. Y.	**8.75**	8.62½	8.50	10.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Demand on Most Products Declining Gradually and Smaller Companies Curtailing Operations—Some Price Weakness

PITTSBURGH, Aug. 6.—As the steel industry enters August, it becomes more and more evident that if operations are maintained at the recent high rate throughout this month it will be principally because the larger integrated companies wish to replenish reserve stocks of steel, which have been reduced to a minimum during the last two or three months.

Smaller companies in this and nearby districts have taken out open-hearths in the last week and further intrenchment is indicated by the slowing down of finishing mills. In spite of this the largest interests in the district are maintaining recent high operating rates and at present plan no curtailment during August. This may be partially explained by the fact that the makers of a wide range of products are able to utilize their full output by a careful allocation of tonnage. On the other hand, it is much more likely that a part of the August output of semi-finished steel will be used in building up reserve stocks of this material. This plan would allow steel makers to continue to profit by high and consequently economic operations during a short period of slightly reduced demand and would also place them in an advantageous position in the case of improved business during September.

Specifications on most products are still declining gradually. Notable exceptions are sheets and plates, while a better demand for cold-rolled strip has recently developed. Backlogs are dwindling and tonnage currently released is not sufficient to sustain present rolling schedules in some departments. In hot-rolled strip, tin plate, and cold-finished and alloy steel bars business has already been reduced to a hand-to-mouth basis, and operating schedules have been tapering slightly for some time. As this tapering began from a capacity rate, the total loss in production has had only a negligible effect on the district's total steel output.

Slightly lower schedules in the heavier products, such as bars and shapes, would have a much greater influence and the completion of rail rollings in the next few weeks will release additional steel tonnage for use elsewhere. Pipe operations show improvement and consistent pushing of plate capacity has not resulted in much better deliveries.

Price weakness persists in some lines despite a firmer stand on the part of leading makers. A price of 3.50c., Pittsburgh, on galvanized sheets, which was formerly made only to jobbers, is now becoming more common on other business. Other grades of sheets show a somewhat firmer tendency and concessions on cold-rolled strip are no longer reported. Following several weeks of continued weakness, wire nails are now quotable at $2 under recent levels. Barbed wire is similarly lower, but manufacturers' wire is holding at recent levels with the help of a rather strong demand.

Pig Iron.—Buyers in this district are still placing occasional small orders for iron to carry them through

August, and no additional activity is expected before September. The last month of the quarter, however, will find consumers with little if any iron on contract, and substantial tonnages are expected to be placed at that time for consumption during the closing months of the year. The fact that foundry operations during the last quarter are still a matter of considerable conjecture has prompted buyers to take a rather cautious stand, and there is nothing in the present situation which indicates any advance in price. It is also unlikely that there will be any shortage of iron at that time. Furnace stocks are now at probably the low point of the year, but present shipments are no longer keeping pace with production at a number of furnaces. Malleable foundries in this district are more active than others and some sellers are picking up a fair tonnage of this grade in small orders. Foundry iron shipments are probably not so heavy as they were a month ago, but there has been no check in the movement of basic iron to steel plants and steel foundries. Prices are unchanged, with foundry and basic at $18.50, Valley, and malleable and Bessemer at $19. The local furnace is quoting prices 50c. higher on all these grades. The Cherry Valley furnace of the Davison Coke & Iron Co. was blown in on Aug. 5.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Semi-Finished Steel.—Billet and blooming mills in this territory are still being operated at close to capacity and raw steel is not being accumulated at any point in the district. However, the supply is now well adjusted to the demands of finishing mills, and consuming departments are no longer having the difficulties which they experienced earlier in the year of having sufficient steel from a tonnage standpoint, but not of the proper specifications. Increasing pipe operations are keeping up the demand for Bessemer steel and although production is not so high as it was two months ago, when substitutions for open-hearth steel were frequent, the output is entirely in line with the correspondingly high open-hearth production. Sales of small tonnages of billets, slabs and sheet bars are being made at $35, Pittsburgh or Youngstown, and although a few large buyers of billets and slabs are reported to have been able to extend their second quarter contracts into this quarter without an advance in price, no recent transactions have been made at less than the quoted market. Wire rods are not quite so active as they were a month ago, but are going to makers of manufacturers' wire at an undiminished rate. The price is well established at $42, Pittsburgh or Cleveland. Skelp is unchanged at 1.85c. to 1.90c. per lb., Pittsburgh, and occasional spot sales are being made.

Bars, Shapes and Plates.—Current demand for plates shows no recession from the high rate which has prevailed for several months and ability to make shipments continues to be the deciding factor in the placing of business. None of the mills in this district is able to make shipment on any sizable tonnage in less than six weeks. Demand from nearby consumers is all that could be expected and regular customers of local mills are generally being taken care of. It is likely that much of the prospective business for which delivery is so urgent comes from other districts and is quite likely offered to several mills in an effort to get prompt shipments. This might give the market a misleading aspect, but it cannot be denied that the bulk of the business in this district is based upon the immediate needs of consumers and is going directly into consumption. Bars and shapes are moving fairly well, but August business is expected to show a slight decline from July. This will be true in spite of the fact that current specifications have changed little in the last few weeks, but backlogs as of July 31 were not so large as they were on the first of the month. No large structural projects have come out in the last week, but there is still a comfortable volume of work in prospect and large fabricating shops have considerable backlogs. Prices are holding at 1.95c., Pittsburgh, on bars, shapes and plates.

Wire Products.—Shipments of manufacturers' wire during July were ahead of June with some makers, and generally showed an increase over July of last year. The first days of the new month brought little change in the volume of specifications, although there are indications that the automobile industry will take less material in August than in preceding months. Agricultural wire products are quiet and weakness in barbed wire is recognized in lower prices. Galvanized barbed wire is now quotable at 3.20c. to 3.30c. per lb., Pittsburgh, with mills holding to the higher figure on small orders. Shading of wire nail prices, long prevalent in the Ohio River territory, has also become more common in the immediate Pittsburgh district, and although mills still quote a base price of $2.65 per keg, the actual market is better represented by a range of $2.55 to $2.65. Galvanized and cement coated nails and staples are also correspondingly weaker.

Tubular Goods.—No large lettings have been reported last week, but prospective projects are being watched carefully by local mills, with early action anticipated on at least one large pipe line. Oil country demand is holding at recent levels and the recent agreement to hold up drilling operations in the Kettleman Hills field of California until 1931 is expected to have a favorable influence on the oil industry. Demand from the automobile industry for mechanical tubing has declined, but a resumption is expected in a few weeks. Other users of mechanical tubing have not reduced their specifications and boiler tubes are moderately active.

Sheets.—The sheet market shows no further weakness except on galvanized

The Iron Age Composite Prices

Finished Steel

Aug. 6, 1929, 2.412c. a Lb.

One week ago	2.412c.
One month ago	2.412c.
One year ago	2.348c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High			Low	
1929	2.412c.,	April 2;		2.391c.,	Jan. 8
1928	2.391c.,	Dec. 11;		2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4;		2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5;		2.403c.,	May 18
1925	2.560c.,	Jan. 6;		2.396c.,	Aug. 18

Pig Iron

Aug. 6, 1929, $18.42 a Gross Ton

One week ago	$18.38
One month ago	18.63
One year ago	17.04
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High			Low	
1929	$18.71,	May 14;		$18.29,	March 19
1928	18.59,	Nov. 27;		17.04,	July 24
1927	19.71,	Jan. 4;		17.54,	Nov. 1
1926	21.54,	Jan. 5;		19.46,	July 13
1925	22.50,	Jan. 13;		18.96,	July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
Del'd Philadelphia	2.27c.
Del'd New York	2.29c.
Del'd Cleveland	1.92½c. to 1.95c.
F.o.b. Cleveland	1.90c. to 1.95c.
F.o.b. Lackawanna	2.05c.
F.o.b. Birmingham	2.15c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	2.05c.
F.o.b. Pittsburgh mills, cut lengths	2.30c.
F.o.b. Birmingham, mill lengths	2.15c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.85c. to 1.90c.
F.o.b. Chicago Heights mill	1.95c.
Del'd Philadelphia	2.27c.

Iron

Common iron, f.o.b. Chicago	2.05c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
F.o.b. Birmingham	2.15c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.15c.
F.o.b. Coatesville	2.05c.
F.o.b. Sparrow Point	2.05c.
F.o.b. Lackawanna	2.05c.
Del'd New York	2.22½c.
C.i.f. Pacific ports	2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.95c.
F.o.b. Chicago	2.05c.
F.o.b. Birmingham	2.15c.
F.o.b. Lackawanna	2.05c.
F.o.b. Bethlehem	2.05c.
Del'd Cleveland	2.14c.
Del'd Philadelphia	2.01c. to 2.06c.
Del'd New York	2.14½c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	2.00c.
Wider than 6 in., P'gh	1.90c.
6 in. and narrower, Chicago	2.20c.
Wider than 6 in., Chicago	2.10c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.30c.
Bars, f.o.b. Chicago	2.30c.
Bars, Cleveland	2.35c.
Shafting, ground, f.o.b. mill	*2.65c. to 3.60c.
Strips, P'gh	2.75c.
Strips, Cleveland	2.75c. to 2.85c.
Strips, del'd Chicago	3.05c. to 3.15c.
Strips, Worcester	2.90c. to 3.00c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails	$2.55 to $2.65
Galvanized nails	4.55 to 4.65
Galvanized staples	3.25 to 3.35
Polished staples	3c. to 3.10c.
Cement coated nails	2.55 to 2.65

	Base per 100 Lb.
Bright plain wire, No. 6 to No. 9 gage	$2.50 to $2.60
Annealed fence wire	2.65 to 2.75
Spring wire	3.50 to 3.60
Galv'd wire, No. 9	3.10 to 3.20
Barbed wire, galv'd	3.20 to 3.30
Barbed wire, painted	2.95 to 3.05
Woven wire fence (per net ton to retailers)	65.00

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass. (wire), mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh.	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham	2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.	2.45c.
No. 13, del'd Philadelphia	2.67c.
No. 13, blue annealed, B'ham	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago dist. mill	2.95c. to 3.05c.
No. 24, del'd Philadelphia	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh	4.10c. to 4.20c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.50c. to 3.60c.
No. 24, f.o.b. Chicago dist. mill	3.70c. to 3.80c.
No. 24, del'd Cleveland	3.59c. to 3.79c.
No. 24, del'd Philadelphia	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham	3.75c. to 3.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill	3.00c. to 3.10c.

Automobile Body Sheets

No. 28, f.o.b. Pittsburgh	4.10c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	4.00c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.35
Standard cokes, f.o.b. Gary	5.45

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$11.20
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.30
25-lb. coating I.C.	$16.70
30-lb. coating I.C.	17.75
40-lb. coating I.C.	19.85

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(1¼% Nickel)	0.25
2100	(1¼% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is ¾c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plate, steel	2.15
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ and ⅜	+13	+48
¼ to ⅜	47	30½	½	23	7
½	53	42½	¾	28	12
¾	58	47½	1 to 2	34	18
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	½	29	13
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on block by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	40	1½ in.	1
2½ in.—2¾ in.	48	1¾ in.	8
3 in.	54	2 in.—2¼ in.	13
3¼ in.—3¾ in.	56	2½ in.—2¾ in.	16
4 in.	59	3 in.	17
4½ in. to 6 in.	48	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	63	3 in.	48
1¼ to 1½ in.	55	3¼ to 3½ in.	50
1¾ in.	39	4 in.	53
2 to 2¼ in.	34	4½, 5 and 6 in.	42
2½ to 2¾ in.	42		

Hot Rolled

2 and 2¼ in.	40	3¼ to 3½ in.	56
2½ and 2¾ in.	48	4 in.	59
3 in.	54	4½, 5 and 6 in.	48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40%, base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

material. Now, however, the 3.50c., Pittsburgh, price to jobbers has been extended to other consumers in many cases. Some mills will not take business at less than 3.60c., and this figure is still representative of the general market. Sales to jobbers at less than 3.50c. are confined to the South, where chaotic price conditions have existed for some time. On black sheets the market seems to have achieved a degree of stability at 2.85c., Pittsburgh, and an advance on fourth-quarter business seems likely. Blue annealed light plates are weak in competition with wide strip, although jobbing mills are so well supplied with business that they are regularly refusing orders at less than 2.20c., Pittsburgh. Shading of the 2.35c., Pittsburgh, price on blue annealed, No. 13 gage, is not reported in this district. Sheet mills in the Pittsburgh, Ohio River and Youngstown districts are generally scheduled at capacity through August and well into September on some finishes. The leading interest has scheduled its mills at 97 per cent of theoretical capacity this week, as against 98 per cent last week, with a scarcely perceptible reduction in backlogs. A strong demand for metal furniture sheets is reported with a price of 4.20c., Pittsburgh, ruling on new business. Shipments of automobile body sheets have declined in the last two weeks and a still greater decrease is expected preparatory to the introduction of new models.

Tin Plate.—The tin plate market shows little change, with current specifications against September tonnage sufficient to maintain mill operations at about 90 per cent of capacity. One or two of the independent companies are at a higher figure. Any change in this situation is expected to be on the side of a decrease, as the tin plate industry operates far enough ahead of consumption to have taken care of the larger requirements of the container manufacturers before the end of the summer.

Strip Steel.—Specifications for cold-rolled strip have been somewhat heavier in the last week and the market has also developed a better tone with regard to price. Mills of several producers are scheduled at close to capacity throughout August and if demand continues to improve larger backlogs will begin to accumulate before the end of the month. No recent concessions from the 2.75c., Pittsburgh or Cleveland, price have been reported and mills are again attempting to get 2.85c. on small tonnages. The hot-rolled strip business continues quiet. Operations are on a hand-to-mouth basis and demand is spotty. Quoted prices are holding, with material 6 in. and narrower at 2c., Pittsburgh, and the wider sizes at 1.90c.

Cold-Finished Steel Bars.—July business was about equal to June with most makers and some of them report a slight improvement in specifications in the last week. Shipments to the automotive industry have declined, but Detroit offices of local companies bear out the impression of the trade that a heavier demand from this source may be expected before the end of the month. Makers of agricultural implements served by Pittsburgh mills have maintained high summer schedules and heavier demand from the automobile industry will offset a seasonal decline from the former channel. Prices are holding satisfactorily at 2.30c., Pittsburgh.

Coal and Coke.—The coke market is still very quiet, with business confined entirely to small lot purchases, which add little to the schedules of ovens. In the Connellsville district beehive production is being maintained at a high rate for this time of the year, but demand is hardly equal to operations, particularly in the case of independent companies. Anticipation of heavy fall business is maintaining the price of furnace coke at $2.75 to $2.85 per net ton, Connellsville. Foundry coke is also quiet and prices are weak. Only the premium brands are bringing the full quoted price. The coal market has not yet felt the beginning of fall demand and shows little improvement.

Old Material.—The scrap market has passed through a week of extreme lethargy, but the situation has developed no justification for lower prices. In fact, short shoveling steel turnings have been sold at $13.50, an advance of 50c. over previous transactions, and machine shop turnings are correspondingly higher. This is a further reflection of the strength in low-priced materials brought about by the high prices of the heavier grades of steel. The Pittsburgh situation is an unusual one, in view of the fact that both heavy melting steel and compressed sheets are equally strong, if not stronger, in the Youngstown district than they are in Pittsburgh. Dealers in Detroit have been paying as high as $15 for compressed sheets for shipment by water to eastern Lake ports. With freight rates to Youngstown and Pittsburgh of approximately $3.50 and $4 a ton, this steel could not be moved here at the price local mills paid for their last tonnages of compressed. Nevertheless, $18.50 remains the top of the market on the basis of actual sales and local consumers show no disposition to pay more. The closing tomorrow of the Pennsylvania Railroad list will probably give the scrap market a more definite position. The week preceding this letting is nearly always a quiet one, and in view of the difference of opinion as to what the current list will bring, there is no justification for changing the present quotation of $18.50 to $19 on heavy melting steel. Some dealers report that heavy melting can be bought at $18 and $18.25 for consumption in this district, but the more common prices seem to range from $18.50 to $18.75. Specialties continue strong with the supply very limited. The monthly list of the Norfolk & Western, which will close on Aug. 9, contains 4400 tons.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$18.50 to $19.00
No. 2 heavy melting steel	16.50 to 17.00
Scrap rails	18.00 to 18.50
Compressed sheet steel	18.00 to 18.50
Bundled sheets, sides and ends	17.00 to 17.50
Cast iron carwheels	16.50 to 17.00
Sheet bar crops, ordinary	19.50 to 20.00
Heavy breakable cast	13.00 to 13.50
No. 2 railroad wrought	18.50 to 19.00
Hvy. steel axle turnings	16.50 to 17.00
Machine shop turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	21.50 to 22.00
Railr. coil and leaf springs	21.50 to 22.00
Rolled steel wheels	21.50 to 22.00
Low phos. billet and bloom ends	22.50 to 23.00
Low phos., mill plates	22.50 to 23.00
Low phos., light grades	20.50 to 21.50
Low phos., sheet bar crops	20.50 to 21.50
Heavy steel axle turnings	16.50 to 17.00
Electric Furnace Grades:	
Low phos., punchings	20.00 to 21.00
Hvy. steel axle turnings	16.50 to 17.00
Blast Furnace Grades:	
Short shoveling steel turnings	13.00 to 13.50
Short mixed borings and turnings	12.50 to 13.00
Cast iron borings	12.50 to 13.00
Rolling Mill Grades:	
Steel car axles	21.50 to 22.00
Cupola Grades:	
No. 1 cast	15.00 to 16.00
Rails 3 ft. and under	20.00 to 21.00

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Light plates, blue ann'l'd (No. 10), 1 to 10 plates	3.45c.
Blue annealed sheets (No. 13), 1 to 10 sheets	3.60c.
Galv. corrug. sheets (No. 28), per square	$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'l'd, base per 100 lb.	$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	2.90 to 3.00
Cement coated nails, per keg	3.05

Aetna-Standard Company Plans Expansion

YOUNGSTOWN, Aug. 6.—The Aetna-Standard Engineering Co., manufacturer of rolling mill equipment, plans to double its common stock, increasing authorized shares to 200,000 from 100,000. Part of the proceeds of this issue will be used to pay a stock dividend and the rest to provide funds for an expansion program. The company controls important patents in the manufacture of continuous mill equipment for producing sheets, strips and tin plate, and operates plants at Warren, Ohio, and Ellwood City, Pa.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4 in. and under 10 in., Pittsburgh	$35.00
Rerolling, 4 in. and under 10 in., Youngstown	35.00
Rerolling, 4 in. and under 10 in., Cleveland	35.00
Rerolling, 4 in. and under 10 in., Chicago	37.00
Forging quality, Pittsburgh	$40.00 to 41.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$42.00
Cleveland	42.00
Chicago	43.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	10.00c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic Swedish, average 65% iron	9.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	33.00c. to 35.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	33.00c. to 35.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$15.00 to $15.50

	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.75 to $2.85
Foundry, f.o.b. Connellsville prompt	3.75 to 4.85
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		Per Gross Ton Furnace
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton
10% $30.00	12%	$34.00
11% 32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton
6% $23.00	10%	$27.00 to $28.00
7% 24.00	11%	29.00 to 30.00
8% 25.00	12%	31.00 to 32.00
9% 26.00		

Other Ferroalloys

Ferrotungsten, per lb., contained metal del'd	$1.40 to $1.50
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.00 to $18.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	$2.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ½ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	70
Semi-finished hexagons castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh	75, 20, 10 and 5
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in packages, Cleveland	75, 20, 10 and 5
Stove bolts in bulk, P'gh	75, 20, 10, 5 and 2½
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(½-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Sales Equal to Shipments, Which Are at Full Capacity—Prices on the Whole Steady

CHICAGO, Aug. 6.—Deliveries from Chicago steel mills promise to step forward as specifications for the week now closing total the largest since April 26. New sales are equal to shipments, which continue at full ingot capacity.

There are no outstanding sources of orders this week, both new purchases and releases coming from widely diversified industries and from a broad territory. Computations are complete on steel shipments in July and it has been found that that tonnage exceeded July, 1928, by 35 per cent. Corresponding increases were recorded in sales and specifications. This is significant, inasmuch as the end of April usually reflects a downward trend in the demand for steel, whereas this year ingot capacity has been fully engaged through the late spring and so far this summer.

One of the foremost light automobile manufacturers has reduced production schedules. This is reflected in lighter specifications for alloy steel bars. On the other hand, several makers are increasing the assembly of new models and larger quantities of steel are being used.

The railroad equipment market is on the mend as to fresh inquiries. The Chicago, Milwaukee, St. Paul & Pacific came into the market today for 1000 70-ton gondola cars, and 500 refrigerator cars will be bought by the Pacific Fruit Express.

Prices on the whole are steady. Plates, shapes and bars readily bring 2.05c. a lb., Chicago, and sellers are holding to current quotations on semi-finished steel, the supply of which is not freer than in recent weeks. Weakness continues in nails and jobbers in the local market are getting concessions on wire as well as on galvanized sheets.

Northern foundry iron quotations are steady at $20 a ton. Scrap quotations are unchanged, though sentiment among sellers is that higher prices are near at hand.

Pig Iron.—August shipments of Northern iron are running fully 5 per cent ahead of the rate in July. New sales are more active as many melters are covering for the remainder of the year. Several inquiries ranging from 500 tons to 2000 tons have come from Indiana buyers. It is estimated here that about 35,000 to 40,000 tons of boat iron has reached Chicago this year. This is said to be about equal to the total tonnage received in the entire season of navigation in 1928. Prices for Southern iron remain weak as sellers press to expand its use in this district. An order for Southern basic iron is said to have been duplicated in the St. Louis territory, where it is also reported that not less than 35,000 tons of Southern iron has been sold in the last month.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil.	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
So'th'n No. 2 fdy. (all rail)	$19.51 to 20.51
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent	29.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—A small resale lot of spiegeleisen has been sold in this district at $33 a ton, Hazard, Pa. On the whole this market is quiet, with shipments moving forward in satisfactory volume.

Prices delivered Chicago: 80 per cent ferromanganese, $112.56; 50 per cent ferrosilicon, $83.50 to $88.50; spiegeleisen, 19 to 21 per cent, $40.76.

Structural Material.—Fresh awards total 3500 tons, and new inquiries call for 6000 tons. Two new jobs are in prospect in Chicago, one being for 2500 tons for a chain of garages and the other an unstated tonnage for the 35-story Otis Estate office building. Little is known regarding the extension to the outer drive and the new bridge that is to span the mouth of the Chicago River except that designs are being prepared. The Cuneo Tower project has hit a snag because of opposition to the height of the outer walls up to the first setback. Competition remains keen for going tonnages and price levels are unchanged.

Mill prices on plain material, per lb.: 2.05c. base, Chicago.

Wire Products.—Specifications were heavier than in the previous week, largely because many jobbers are filling in stocks, which had been allowed to dwindle. Quotations on wire to the manufacturing trade, which is taking tonnages at a uniform rate, are steady, but jobbers in Chicago and to the south, notably St. Louis, are getting concessions on both wire and nails. Wire mill operations are holding at 65 per cent of capacity and at that rate stocks are expanding. For the country as a whole crops are reported to be in a better than average condition. Mill prices on wire and wire products are given on page 367.

Cold-Rolled Strips.—Prices are unchanged in a quiet market. Specifications on the whole are lighter, and operations are tending downward from the current rate of 70 per cent of capacity. In the absence of buying, except in small and scattered lots, producers' backlogs are shrinking.

Hot-Rolled Strips.—Operations in this district are near capacity and specifications are fully equal to shipments. Deliveries are at reasonably close range.

Rails and Track Supplies.—Rail mill operations remain steady, with schedules well set for August. Both new orders and fresh inquiries are limited to miscellaneous small lots. Definite word has not yet come from the Northern Pacific, which is expected to inquire for 15,000 tons. New business in track accessories totals 2500 tons. The end of the summer demand for these commodities is in sight and mills look for lighter production schedules at an early date. The light rail market is dull.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Cast Iron Pipe.—The market is more active, although little new business is developing in and near Chicago. The Great Northern is said to have placed 32,000 ft. of 10-in. pipe with an unnamed bidder, and James B. Clow & Sons have been awarded 125 tons of 4 to 24-in. pipe by Grand Rapids, Mich. The American Cast Iron Pipe Co. was successful bidder on a tonnage for Minneapolis. Peoria, Ill., is in the market for 500 tons of pipe and fittings for a sewage disposal plant, and Adrian, Mich., will buy 100 tons of 10 to 16-in. pipe. Several Western railroads have made purchases of small tonnages. Deliveries are prompt and prices are steady at $45.20 to $46.20 a ton, delivered Chicago, for 6-in. and larger diameter.

Prices per net ton, del'd Chicago: Water pipe, 6-in. and over, $45.20 to $46.20; 4-in., $49.20 to $50.20; Class A and gas pipe, $3 extra.

Sheets.—Buying for close-by needs continues brisk, and producers' books are growing at a rapid pace. Hot weather is having a telling effect on output, which for the week did not average above 80 per cent. This condition, plus the tight situation in sheets bars, is resulting in deliveries falling back, especially in the blue annealed product. Promises of shipments of light plates and blue annealed sheets are now beyond 12 weeks, while deliveries of galvanized and black sheets have advanced to a range of four to five weeks. Prices are less stable, with concessions being granted on galvanized sheets to be delivered in the South and Southwest and with local jobbers being able to get better than quoted prices on carloads of the galvanized and black grades. Distribution by the jobbing trade is heavy and this is reflected to the mills in large specifications.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3.10c.; No. 24 galv., 3.85c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Bars.—Both specifications and sales of mild steel bars are well above the weekly average to date this year and deliveries are slowly creeping forward. Forgers in the Chicago district are taking liberal quantities of bars, with their operations continuing near capacity. Pressure for steel by the agri-

cultural implement trade is not so severe as earlier in the year, though shipments from mills are somewhat larger as August gets under way. Specifications for alloy steel bars are lighter, following curtailment of output by one of the foremost makers of light motor cars. Demand from other users remains steady, and spot purchases are active at current quotations. Output averages a trifle above 70 per cent of capacity. Demand for iron bars from the railroads thus far this year has shown marked improvement over that of the first seven months of 1928. Specifications for rail steel bars are equal to production, with local mills on a double turn basis. Mill prices remain firm at 1.95c. a lb., Chicago Heights, and deliveries range from three to four weeks.

Reinforcing Bars.—Contracts for reinforcing bars have been fairly numerous in the last 10 days and, if releases come as expected by the trade, shop operations soon will be lifted above the current range of 60 to 70 per cent. Dealers expect prices to strengthen. This week gives no reflection of such a change, and it could not be made quickly because of outstanding quotations on a long pending list. Close to 450 tons has been ordered for a warehouse in Chicago. A commercial building will take 400 tons and a garage 250 tons. Sub-contractors are taking bids on reinforcing steel for a Jewel Tea Co. building at Barrington, Ill. There is still doubt whether this tonnage will be purchased by the general contractor or by a sub-contractor. Recent awards and new inquiries are given on page 386.

Plates.—Over 7000 tons of tank plates will be required in two orders for oil storage tanks which will be fabricated near Chicago for shipment to the South and to the Southwest. Tank builders in the Chicago district and in the Southwest are busy, with well balanced books, and specifications forwarded by them to local mills are in good volume. Pending tank jobs are in good number and well scattered over a wide territory. Shipments of plates to the Milwaukee pipe manufacturers are heavy. A local fabricator has ordered 1000 tons of plates for pipe and plate work in connection with a new blast furnace which was announced in the spring by the Wisconsin Steel Works. Deliveries on plates are again moving ahead under the influence of heavier specifications. The best promises that are now being made range from seven to eight weeks. The railroad car market is less active from the viewpoint of specifications against old orders, but there is greater promise that fresh purchases are not far in the future. The Pacific Fruit Express is inquiring for 500 refrigerator cars, and it is reported that a Western railroad will soon ask for prices on 1000 freight cars. It is computed here that replacements by private buyers and railroads have barely kept pace with the retirement of cars in the last three years. Many believe that greater efficiency in the use of equipment has not kept up with increases in the volume of freight. The movement of wheat from Kansas is unusually heavy and complaints concerning car service are reported. It is stated that the Santa Fe, Burlington, Chicago & North Western and the Illinois Central are among the Western railroads that may enter the market in the early fall.

Bolts, Nuts and Rivets.—Shipments of these commodities so far in August are running parallel with the rate in July. Specifications in recent days have been heavier, giving encouragement to the trade that demand will gain headway. Farm implement manufacturers are ordering cautiously but at a rate which indicates they are not far from capacity operations.

Coke.—The Chicago by-product foundry coke market is quiet except in the matter of shipments, which show no change from recent weeks.

Old Material.—Brokers are losing none of their bullish attitude, in spite of stiff resistance encountered from buyers. Sellers discount the statement of some large users that stock piles are ample, preferring to believe that many melters are leaning heavily on current shipments. At the moment incoming scrap is ample to meet the needs of buyers. However, there are persistent reports of round tonnages of manufacturers' scrap moving east from Michigan and of railroad scrap that is being diverted from Chicago to other producing centers. A reflection of the brokers' attitude is shown in their willingness to pay railroads as high as $16 a gross ton, delivered, for heavy melting steel, which, as gaged by the last prices paid by consumers, would go against orders at $15.25 a ton. This week a dealer has paid a railroad the equivalent of $19.70 a gross ton, delivered, for a tonnage of rerolling rails. This is $1.20 a ton above the price last paid by a consumer. On the whole, it may be said that brokers' bids for railroad items are 50c. to 75c. a ton above quotations on the last consumer sales.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	2.15c. to 2.35c.
Reinforc'g bars, rail steel	1.85c. to 1.95c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (¼ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ⅜ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	3.20
Cement c't'd nails, base per keg	3.20

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel	$14.75 to $15.25
Shoveling steel	14.75 to 15.25
Frogs, switches and guards, cut apart, and misc. rails	16.50 to 17.00
Hydraul. compressed sheets	13.00 to 13.50
Drop forge flashings	10.50 to 11.00
No. 1 busheling	13.00 to 13.50
Forg'd cast and r'l'd steel carwheels	18.50 to 19.00
Railroad tires, charg. box size	18.50 to 19.00
Railroad leaf springs cut apart	18.50 to 19.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	16.75 to 17.25
Coil springs	19.00 to 19.50
Electric Furnace Grades:	
Axle turnings	14.50 to 15.00
Low phos. punchings	16.50 to 17.00
Low phos. plates, 12 in. and under	16.50 to 17.00
Blast Furnace Grades:	
Axle turnings	10.75 to 11.25
Cast iron borings	9.75 to 10.25
Short shoveling turnings	9.75 to 10.25
Machine shop turnings	7.00 to 7.50
Rolling Mill Grades:	
Iron rails	16.00 to 16.50
Rerolling rails	17.50 to 18.00
Cupola Grades:	
Steel rails less than 3 ft.	17.75 to 18.25
Steel rails less than 2 ft.	18.25 to 18.75
Angle bars, steel	17.00 to 17.50
Cast iron carwheels	14.00 to 14.50
Malleable Grades:	
Railroad	16.75 to 17.25
Agricultural	15.50 to 16.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms	21.00 to 21.50
Iron car axles	26.00 to 26.50
Steel car axles	16.50 to 17.00
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	13.00 to 13.50
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	14.50 to 15.00
Pipes and flues	10.00 to 10.50
Cupola Grades:	
No. 1 machinery cast	14.50 to 15.00
No. 1 railroad cast	13.75 to 14.25
No. 1 agricultural cast	13.25 to 13.75
Stove plates	12.25 to 12.75
Grate bars	11.75 to 12.25
Brake shoes	10.50 to 11.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Advances in Detroit Scrap

DETROIT, Aug. 6.—Curtailed automobile production is reflected in the market on waste material, in that heavy melting and shoveling steel advanced 25c. a ton, long turnings 50c., and hydraulic compressed and flashings, 25c. There have been some sales to mills and furnaces, with the result that the market is strong.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$14.25 to $14.75
Borings and short turnings	9.00 to 9.50
Long turnings	8.50 to 9.00
No. 1 machinery cast	12.50 to 13.00
Automobile cast	13.00 to 13.50
Hydraul. comp. sheets	14.00 to 14.50
Stove plate	9.00 to 9.50
New No. 1 busheling	12.50 to 13.00
Old No. 1 busheling	11.00 to 11.50
Sheet clippings	8.75 to 9.25
Flashings	13.00 to 13.50

New York

Record Amount of Structural Steel Work Pending—Pig Iron Prices Are Steadier

NEW YORK, Aug. 6.—Pig iron sales continue in fair volume, totaling 11,000 tons for the week. While buyers are still rather apathetic, sellers are succeeding in booking considerable business by thoroughly canvassing the trade. Prices are tending toward greater strength, with $18, base Buffalo, or the equivalent, more frequently the minimum quotation available on foundry grades. Relatively little Alabama iron is reported sold, but the fact that lower rail-and-steamer rates from Birmingham went into effect Aug. 1 may facilitate sales, particularly of smaller lots. These new rates, which are $5 a ton to Baltimore, $5.25 to Philadelphia, $5.50 to New York and $5.75 to Boston, are distinct from the rail-and-barge rates quoted on shipments via Norfolk, Va. The Eastern Malleable Iron Co., Naugatuck, Conn., is reported to have closed against its inquiry for 5000 tons of malleable. The American Tube & Stamping Co., Bridgeport, Conn., has been feeling out the market on basic and may inquire for as much as 5000 tons.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$22.41 to $22.91
*Buf. No. 2, del'd east. N. J.	20.78 to 21.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	20.89 to 22.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	21.39 to 22.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

*Price delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Warehouse Business.—Total business in July was less than in June, but considerably better than is usual at this season. There is a fair demand for structural material and sheets, but sheet prices, especially galvanized, are still subject to concessions of $1 to $2 a ton, and shading of prices on blue annealed sheets is general, concessions sometimes amounting to $4 and more a ton.

Cast Iron Pipe.—Prices continue irregular, with Northern makers of pressure pipe usually quoting from $32 to $33 per ton, f.o.b. foundry, although $31 a ton has not entirely disappeared. An exporter in New York is about to close on 300 tons of 18-in. water pipe for export to Hayti. The Texas Co., New York, is in the market for about 500 tons of large size pipe for shipment to Texas.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $33.60 to $34.60; 4-in. and 5-in., $36.60 to $37.60; 3-in., $42.60 to $44.60. Class A and gas pipe, $3 extra.

Reinforcing Bars.—Aside from 400 tons of bars for sewer work in the Bronx, awarded to the Kalman Steel Co., orders have consisted of small lots of less than 100 tons each. Seven hundred tons of bars for the Chevrolet assembly plant at Tarrytown, N. Y., are still pending. Prices are firm and unchanged.

Billet steel reinforcing bars in 40, 50 and 60-ft. lengths, 2.05c. per lb., Pittsburgh, and 2.30c. per lb., Pittsburgh warehouse, for cut lengths. Out of New York warehouse, 2.90c. per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Finished Steel.—The contract for 250,000 tons of pipe for a gas pipe line to be built by Henry L. Doherty & Co., New York, has not yet been let, but early action is expected. The pipe line, which is to extend from the Texas Panhandle to communities in the Chicago district, may take as high as 275,000 tons. Structural steel awards in New York and vicinity have been unusually heavy, mostly for apartment houses and office buildings. The largest job, 6000 tons, was for the London Terrace apartments on West Twenty-third Street. Other outstanding bookings included 5000 tons for a telephone building on West Eighteenth Street, 3800 tons for an addition to Hell Gate power house and 2500 tons for New York Central car shops at Harmon, N. Y. The volume of pending work indicates that steel fabricators will be well engaged through the latter part of the year. In fact, fabricators agree that never before has there been so large an amount of inquiries as at present. Sheet steel makers say that buying has held up well, and deliveries range from four to six weeks, depending upon the grade of material. However, prices continue somewhat soft, especially in galvanized sheets, which have been sold to consumers in some cases at 3.50c., Pittsburgh. Large tonnages of galvanized are going into the South for roofing purposes and there concessions of $2 to $4 a ton have been made to obtain business. Black sheets are quoted at 2.85c. to 2.95c., and blue annealed appears firm at 2.25c. for No. 13 gage. Wire goods are weak, with plain wire selling as low as $2.40 per 100 lb., Pittsburgh. Wire nails also are being shaded and can be secured for $2.55 per keg, Pittsburgh, or less. Inquiries for well over 100,000 base boxes of tin plate are a feature of the foreign market. About 75,000 boxes is for delivery to Russia.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.29c.; plates, 2.22½c.; structural shapes, 2.19½c.; bar iron, 2.14c.

Coke.—The market on both furnace and foundry coke continues steady and unchanged, with furnace grade quoted at $2.75 to $2.85 per net ton, Connellsville, and special brands of beehive foundry coke at $4.85 per net ton, ovens. Delivered prices of foundry coke are $8.56 per net ton, delivered to northern New Jersey, Jersey City and Newark and $9.44 to New York or Brooklyn. By-product coke is quoted at $9 to $9.40 a net ton, Newark or Jersey City, and $10.06, New York or Brooklyn.

Old Material.—No. 1 heavy melting steel is being bought at $16.25 per ton, delivered Claymont, Del., and $16.50

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.85c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10

	Per 100 Ft.
Boiler Tubes—	
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
⅜-in. butt	46	29
½-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+ 9
1-1¼-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R.

One Pass

	Per Lb.
Nos. 18 to 20	3.80c.
No. 22	3.95c.
No. 24	4.00c.
No. 26	4.10c.
No. 28*	4.25c.
No. 30	4.50c.

Sheets, Galvanized

	Per Lb.
No. 14	4.40c.
No. 16	4.25c.
No. 18	4.40c.
No. 20	4.50c.
No. 22	4.60c.
No. 24	4.75c.
No. 26	5.00c.
No. 28*	5.25c.
No. 30	5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

per ton, delivered Conshohocken, Pa. No. 2 steel is quoted by brokers at $12 per ton, delivered Phoenixville; $13.50 per ton, delivered Harrisburg, and $14 per ton, delivered Conshohocken, Pa. Machine shop turnings are slightly stronger, with brokers paying $11.50 a ton, delivered either to Phoenixville or Conshohocken, Pa. Other grades of scrap are quiet, but prices are firm. Export, particularly to Japan, continues active, and another ship for Japan will begin to load next week.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$12.75 to	$13.35
Heavy melting steel (yard)	8.00 to	9.75
No. 1 hvy. breakable cast.	10.75 to	11.75
Stove plate (steel works)	8.00 to	8.25
Locomotive grate bars	8.25 to	8.75
Machine shop turnings	7.75 to	8.00
Short shoveling turnings	7.75 to	8.00
Cast borings (blast furn. or steel works)	7.00 to	7.25
Mixed borings and turnings	6.75 to	7.25
Steel car axles	19.50 to	20.00
Iron car axles	24.00 to	25.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)		10.75
Forge fire	9.75 to	10.25
No. 1 railroad wrought	12.00 to	12.50
No. 1 yard wrought, long	11.00 to	11.50
Rails for rolling	13.25 to	13.75
Cast iron carwheels	12.50 to	13.00
Stove plate (foundry)	8.00 to	8.50
Malleable cast (railroad)	14.00 to	14.50
Cast borings (chemical)	10.00 to	10.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$17.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	15.00
No. 2 cast (radiators, cast boilers, etc.)	14.50

Automobile Outlook

The automobile industry, according to *Automotive Industries*, has entered the second week in August with production at a rate which promises to show a total for the month well above that of August last year, when the factories in the United States and Canada turned out 492,543 cars and trucks. Several companies, which either have announced new models or are about to make such announcements, are resuming or contemplating comparatively high production schedules.

New car registrations in Detroit during the last few days in July spurted suddenly forward with the result that the total for the month was brought to a figure well above that of July last year despite less favorable outlook earlier in the month.

Although still quite heavy, new and used car stocks are declining, dealers report. Car stocks reached their peak in April, and have been showing a continued sharp decline since.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.60c. to 4.75c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	$2.90
No. 9 gal. wire, per 100 lb.	3.35
Com. wire nails, base per keg	2.90

*Net base, including boxing and cutting to length.

Cleveland

Steel Demand Drops Below July Rate, But Mills Have Heavy August Commitments

CLEVELAND, Aug. 6.—Demand for finished steel fell off in the past week, specifications for most products being light. However, July business with most mills was better than in June of this as well as in June of last year. While deliveries have further improved, mills are comfortably filled for August on nearly all products. Steel bars are considerably easier and buyers can now secure fairly prompt shipments. Deliveries on plates are still quite extended. Most of the sheet mills still have good backlogs, although some have nearly caught up on auto-body sheets. Mills are committed for several weeks on hot-rolled strip but some need cold-rolled strip tonnage.

Announced schedules by the automobile manufacturers indicate that the production of motor cars will be somewhat larger this month than in July, owing to the increasing production by two or three makers that have brought out new models. However, this industry is not expected to get back into full swing much before October. The Ford Motor Co. is continuing this month at the same production schedule it maintained in July.

Orders for two lake boats, each requiring 5000 tons of plates and shapes, have been placed by the Pittsburgh Steamship Co., subsidiary of the United States Steel Corporation. One will be built by the Toledo Shipbuilding Co. and the other by the Great Lakes Engineering Works.

Weakness in sheet prices has become more pronounced. On the other hand, some of the cold-rolled strip mills have advanced their price $2 a ton.

Pig Iron.—Sales gained somewhat in the past week, Cleveland interests disposing of 20,000 tons of foundry and malleable iron. Little interest is being taken in the fourth quarter, although a few of the sales were made for delivery extending over the remainder of the year. While shipments during July were slightly better than in June, they were not up to the May record. There has been some increase in the demand by stove and furnace manufacturers, which fact, to some extent, has offset the decrease in the melt by automobile foundries. With the expectation of increased activity by the automotive industry next month some predict that August foundry activities will be at the low point for the year. New inquiry is rather light. Among inquiries is one from a central Indiana melter for 1000 tons of foundry iron. The low price on Southern foundry iron has diverted to Southern furnaces a few lots of iron in southern Ohio. Prices are firm and unchanged at $18.50, Cleveland, for outside delivery, $19 for local delivery and $20, Lake furnace, for Michigan shipment. The market in Buffalo has a firmer tone, and it is claimed that $18 is now the minimum price Buffalo furnaces will quote on foundry iron for Eastern shipment. Pickands, Mather & Co. will blow out its B stack in Toledo Aug. 7 for relining.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25		$19.50
S'th'n fdy., 1.75 to 2.25	$20.00 to	20.50
Malleable		19.50
Ohio silvery, 8 per cent		28.00
Basic Valley furnace		18.50
Stand. low phos., Valley	26.50 to	27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Iron Ore.—Another record was broken in shipments of Lake Superior ore during July, when the water movement was 10,670,882 tons, an increase of 1,691,183 tons over the corresponding month last year. The previous high mark for July was in 1918, when shipments were 10,659,203 tons. The record for monthly shipments was made in August, 1926, when the movement was 10,709,260 tons. All records for corresponding months were also broken in April, May and June. The movement by water up to Aug. 1 was 32,910,820 tons, an increase of 9,635,996 tons over last year. This breaks all previous records, the largest movement to Aug. 1 in previous years being made in 1918, when the mines shipped 29,608,933 tons. With the record breaking movement during the first half of the season, shipments this year will probably be considerably heavier than was expected early in the year. Some estimates place the movement for the season at 65,000,000 tons, breaking the record of 1916, when the water movement amounted to 64,734,198 tons.

Semi-Finished Steel.—The leading local producer has caught up on deliveries to an extent that it can now make prompt shipment if desired, although it still has a two weeks' backlog. Specifications on contracts continue to come out in good volume. There is an absence of new inquiry.

Coke.—Foundry coke shipments show some falling off. New demand is very light. Some activity is developing in by-product foundry coke as dealers are starting to purchase for stocks. The price is unchanged at $4.50 per net ton, Ohio ovens, for egg coke. Ohio by-product foundry coke is quoted at $8.25, Painesville, for August shipment.

Strip Steel.—Several makers have advanced the price $2 a ton on cold rolled strip steel to 2.85c., Cleveland and Pittsburgh, and some announce that they will quote this price only to large buyers, asking 2.95c. for small lots. The advance cannot apply to much business during the present quarter, as most consumers are under 2.75c. contracts. Makers claim that

that price leaves too low a margin of profit. Fender stock remains unchanged at 4.25c. for No. 20 gage. Mills are getting a fair volume of specifications, but do not have much backlog. Most producers still have a good tonnage of hot rolled strip on their books and prices are firm at 1.90c., Pittsburgh, for wide strip and 2c. for narrow.

Steel Bars, Plates and Shapes.—Demand for steel bars has decreased considerably, owing largely to the slowing down of the automotive industry. Plates continue to move in good volume to manufacturing plants and tank fabricators. A local mill as well as some other mills is fully committed on plates for four weeks. Specifications for plain structural material from manufacturing plants are fair. The building field is quiet. Prices are steady at 1.90c. to 1.95c., Cleveland, for steel bars and 1.95c., Pittsburgh, for plates and shapes.

Sheets.—Specifications are rather light and most mills have made further reductions in their backlogs. While some mills have only enough orders for auto body sheets to keep them fully engaged for about two weeks most producers are committed through August or a little longer on all grades. An increase in demand is expected next month, as some consumers have already issued September releases. Prices show more of an irregular tendency. Galvanized sheets have been quoted to jobbers at 3.50c., Valley, or equivalent to 3.40c., Pittsburgh. There are reports of shading of common black sheets to 2.75c., Pittsburgh, to barrel manufacturers and concessions to 2.25c. are being made on blue annealed sheets carrying fair extras. Shading to 2.10c. on blue annealed light plates continues.

Wire Products.—Nail prices have become more irregular in some sections with reports of prices of $2.50 per keg or lower and some jobbers are reported to have become a disturbing factor by selling at prices lower than the regular mill prices. Plain wire and galvanized wire for manufacturing purposes are moving in full volume. Wire appears to be holding to regular quotations in this market.

Reinforcing Bars.—Inquiry is not active. The only award of any size during the week was 250 tons for an addition to the plant of the Richman Brothers Co., Cleveland. Prices are somewhat irregular.

Cold Finished Steel Bars.—Demand has slowed down sharply as some consumers have curtailed operations, owing to reduced business from the automotive industry, and others are cutting down their inventories.

Warehouse Business.—While business has been rather light so far this month, demand is about normal for this season. Jobbers are getting a fair volume of diversified orders from machine tool and equipment manufacturers. Business from the building field is rather light. Prices are firm.

Old Material.—Selected heavy melting steel scrap has advanced 50c. a ton, to $16 to $16.25, but the grade used by one Cleveland consumer has not changed. Compressed sheet steel and machine shop turnings have also advanced 50c. a ton. Blast furnace grades are slightly weaker, dealers paying $10.50 to $10.75 for this material. **The local market continues very dull, as mills have large stocks and are still restricting shipments. The Valley market is firm. Dealers are paying $18.25 to $18.50 for No. 1 heavy melting steel and $17.50 to $18 for compressed sheet steel for Youngstown delivery.**

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$15.00 to $15.50
No. 2 heavy melting steel	14.50 to 15.00
Compressed sheet steel	15.00 to 15.50
Light bundled sheet stampings	12.00 to 12.50
Drop forge flashings	13.00 to 13.25
Machine shop turnings	9.50 to 10.00
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	16.00 to 16.50
No. 1 busheling	13.25 to 13.75
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet, bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	10.50 to 10.75
Mixed borings and short turnings	10.50 to 10.75
No. 2 busheling	10.50 to 10.75
Cupola Grades:	
No. 1 cast	16.75 to 17.25
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft	18.50 to 19.00
Miscellaneous	
Railroad malleable	18.00 to 18.50
Rails for rolling	16.25 to 16.50

Philadelphia

Steel Buying Shows Increase—Basic User Contracts With Eastern Pennsylvania Furnaces

PHILADELPHIA, Aug. 6.—The lull in steel buying which appeared toward the end of June shows evidence of having terminated with July and most mills have received an increased volume of specifications on current contracts during the past week. This increase in buying had not been generally expected for another fortnight or more, so that mills are generally beginning to look forward to the remainder of the year with optimism.

The Pennsylvania Railroad will open bids Aug. 16 on 20,000 tons of plates, 6500 tons of bars and 2255 tons of shapes.

A feature of the pig iron market is the purchase of a sizable tonnage of basic by a consumer in this district, all from eastern Pennsylvania furnaces in competition with sellers of Southern iron.

Pig Iron.—Eastern Pennsylvania furnaces are quoting foundry iron at $21 a ton, base, and occasionally shading this by 50c. a ton, when competition is encountered from Birmingham iron. The Lobdell Car Wheel Co., Wilmington, Del., has closed on about 200 tons of foundry iron with an eastern Pennsylvania furnace, although Birmingham sellers competed for the business. The American Brake Shoe & Foundry Co. is inquiring for a carload of foundry iron for its Baltimore plant, and the New York Air Brake Co., Watertown, N. Y., is in the market for a carload of foundry grade. In the past week a Coatesville, Pa., consumer of basic has closed on about 18,000 tons with three eastern Pennsylvania furnaces for delivery in August, September and October. Although the buyer had previously bought a barge cargo of Birmingham basic at a price said to have been $19.13 per ton, delivered, no further contract for Southern iron is reported to have been made by this buyer. The eastern Pennsylvania price is understood, however, to have been less than $20 a ton, delivered.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$21.26 to $21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.26
East. Pa. No. 1X	22.26 to 22.76
Basic (del'd east. Pa.)	19.75 to 20.25
Gray forge	20.00 to 20.50
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. br'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.04
Va. No. 2X, 2.25 to 2.75 sil.	24.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Bars.—Mills are maintaining high operating rates and the price is firm at 1.95c., Pittsburgh, or 2.27c. per lb., delivered Philadelphia. The Pennsylvania Railroad will open bids Aug. 16 on 6500 tons of bars.

Reinforcing Bars.—The greater

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.55c.
Steel bands, No. 12 to ⅜-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more: 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more: 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

part of the tonnage of reinforcing bars pending award consists of small lots of considerably less than 100 tons. Competition continues keen and billet steel bars are still quoted at 1.95c. to 2.05c. per lb., Pittsburgh, or 2.27c. to 2.37c., delivered Philadelphia, with the $5 extra for cutting to length sometimes disregarded by the distributer. Rail steel bars are quoted at 1.95c. per lb., Franklin, Pa., or Tonawanda, N. Y., or 2.27c., delivered Philadelphia, with no extra for cutting to length.

Shapes.—Business has begun to increase and mills are in some instances offering two to three weeks' delay in delivery for certain specifications. Fabricators are well engaged and some substantial contracts are pending, including 2200 tons in a building for the Atwater Kent Mfg. Co. and a total of 14,500 tons in two bridges over the Hackensack River for the Pennsylvania Railroad. Prices are unchanged at 1.95c. to 2.05c. per lb., f.o.b. nearest mill to consumer, or 2.01c. to 2.11c., delivered Philadelphia.

Plates.—The past week has brought an increase in the volume of specifications against contracts. The Pennsylvania Railroad opens bids Aug. 16 on 20,000 tons of plates, part of its usual requirements. The price is unchanged at 2.05c. per lb., Coatesville, Pa., or 2.15c. per lb., delivered Philadelphia.

Old Material.—Consumers are receiving deliveries on contracts and, as a rule, show but little interest in making new purchases of scrap. No. 2 heavy melting steel is active with purchasing by brokers to fill contracts. There is also a fair tonnage of No. 1 heavy melting steel moving to consumers at Claymont, Del., and Coatesville, Pa. Cast grades of scrap continue inactive.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$16.50 to $17.00
Scrap T rails	16.00 to 16.50
No. 2 heavy melting steel	12.50 to 14.50
No. 1 railroad wrought	16.00 to 16.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	14.50 to 15.50
Hydraulic compressed, old	12.00 to 12.50
Machine shop turnings (for steel works)	11.50 to 12.00
Heavy axle turnings (or equiv.)	14.00 to 14.50
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	15.00 to 15.25
Railroad grate bars	12.00 to 12.50
Stove plate (for steel works)	12.00 to 12.50
No. 1 low phos., hvy., 0.04% and under	22.00 to 23.00
Couplers and knuckles	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
No. 1 blast f'nace scrap	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific.)	15.00
Shafting	19.00 to 19.50
Steel axles	23.00 to 23.50
No. 1 forge fire	14.00
Cast iron carwheels	16.50 to 17.00
No. 1 cast	16.50 to 17.00
Cast borings (for chem. plant)	14.50
Steel rails for rolling	16.50 to 17.00

Sheets.—Blue annealed sheet prices are firm at 2.35c. per lb., Pittsburgh, or 2.67c., Philadelphia, for No. 13 gage, with light plates, blue annealed, No. 10 gage, at 2.20c., Pittsburgh, or 2.52c., delivered Philadelphia. Automobile manufacturers are showing less activity than a few weeks ago, but are still accepting shipments on contracts. Black and galvanized sheets have settled to 2.85c., Pittsburgh, or 3.17c., delivered Philadelphia, for black, and 3.55c. to 3.60c., Pittsburgh, or 3.87c. to 3.92c., delivered Philadelphia, for galvanized. Some galvanized sheet business was recently closed at 3.50c., Pittsburgh, or 3.82c., delivered Philadelphia, but sellers are beginning to show more firmness and it is doubted that less than 3.55c., Pittsburgh, could be done today. Radio manufacturers are less active in buying sheets, having covered their requirements for the present.

Imports.—In the week ended Aug. 3, ore arrivals at this port consisted of 2500 tons of chrome ore from Portuguese Africa and 36 tons of ferrochrome from Switzerland. The only steel imports were 89 tons of structural shapes from Germany and 6 tons of steel scrap from the United Kingdom.

Welding Society Program Stresses Research

Six technical sessions will be necessary to present the material available at the fall meeting of American Welding Society, held in Cleveland, Sept. 9 to 13, simultaneously with other metallurgical societies. Sessions and headquarters will be at Hotel Statler.

Nine research papers will be presented, three of them dealing with newly discovered non-destructive tests of welds. One of these tests, based on electrical conductivity, is the discovery of Elmer Sperry, well known inventor and president of American Society of Mechanical Engineers. The second involves the use of the stethoscope. The third is an X-ray method.

In addition, three special sessions will be devoted largely to research. A meeting of the Bureau of Welding will deal with a variety of research projects. The meeting of the structural steel welding committee will record advances in that fast-developing field. A special conference of college professors and other research workers will discuss further activities along this line.

Two papers will deal with the welding of boiler tubes and drums, the tubes of mercury boilers, and containers for high pressure. Other subjects covered by technical papers include gas welding of steel buildings, automatic welding of thin sheets, welding of pipe lines, replacement of castings by welding in machine construction, and the welding of copper alloys and high-strength aluminum alloys.

To Increase Capital Stock

YOUNGSTOWN, Aug. 6.—On Aug. 15 a special stockholders' meeting of the Youngstown Sheet & Tube Co. will be held to approve the proposed increase in common capital from 1,000,000 to 2,000,000 shares and a 20 per cent stock dividend, which will require 200,000 shares of the new stock.

Railroad Equipment

Inquiries Pending for More Than 5000 Cars

DESPITE the fact that buying of railroad equipment has been light, manufacturers look for considerable business to be placed in the near future. There are inquiries now pending for about 4500 freight cars and between 500 and 600 passenger cars, most of which is likely to be awarded this month. The Chicago, Milwaukee, St. Paul & Pacific is in the market for 1000 70-ton gondola cars and the Boston & Maine is considering the purchase of a like number of box cars. Details of the week's business follow:

General Chemical Co. has placed an order for 15 75-ton sulphuric acid tank cars and 21 50-ton sulphuric acid tank car tanks with American Car & Foundry Co.

Ann Arbor is inquiring for 100 hopper car bodies.

Chicago, Milwaukee, St. Paul & Pacific is in market for 1000 70-ton gondola cars.

Boston & Maine is considering purchase of 1000 box cars.

Wabash is inquiring for 100 50-ton steel hopper car bodies.

Bessemer & Lake Erie is asking bids on 25 70-ton steel gondola cars.

To Build Steel Plant at Pretoria, South Africa

Pretoria, South Africa, is to have a steel plant of 200,000 tons annual capacity, laid out according to the best American and European practice. It is expected to be complete from coke ovens, blast furnaces and open-hearth furnaces through to the rolling mills. The International Construction Co., Ltd., 56 Kingsway, London, W.C.2, it is understood, has been appointed engineer, working with a committee of four experts representing the steel company, the South African Iron & Steel Industrial Corporation, Ltd.

Tariff Bill Progress

WASHINGTON, Aug. 6.—The past week has developed no definite information as to the revision of the metal schedule of the House tariff bill by the Republican members of the Senate Committee on Finance. Members of the committee will not discuss what was done in connection with their work on the metal schedule, which was completed early last week. Rumors are conflicting and are not considered to be reliable.

Beginning yesterday the majority members are holding night sessions in an effort to have the bill ready to report to the Senate on Aug. 19, the date on which it was proposed that the Senate reconvene, but there is doubt that the bill will be ready by that time, in which event it is likely that reconvening of the Senate will be postponed.

Pacific Coast

Current Bookings Light, But Pipe Lines Will Require 13,000 Tons of Plates—Structural Awards Double Last Year's

SAN FRANCISCO, Aug. 3., (*By Air Mail*).—Awards of iron and steel products on the Pacific Coast this week were the lightest in many weeks, both in the aggregate tonnage and in the number of projects placed. The two outstanding lettings of the week were 3700 tons of plates for the Cedar River Pipe Line, Seattle, placed with the Western Pipe & Steel Co. and 1000 tons of reinforcing bars and wire mesh for a project at Hawthorne, Nev., secured by the Truscon Steel Co. Several pipe line projects in the Northwest, which are up for, or about to come out for, figures, will require close to 13,000 tons of plates.

The trade is exceptionally interested in the report that the United States Steel Corporation has taken a 90-day option on the properties of the Columbia Steel Corporation.

Building construction in July compared favorably with the previous month's aggregate, but fell below that of July, 1928. Permits issued in Los Angeles amounted to $7,942,133. Seattle, Oakland and Portland turned in totals of $1,382,220, $1,273,959 and $1,113,656 respectively.

Pig Iron.—Movement of foundry pig iron is limited to relatively small tonnages. One importer recently unloaded about 500 tons in various Pacific Coast ports. Importations of foreign iron during April, figures for which have just been released, show the smallest tonnage of the year, being less than 500 tons. Prices remain unchanged.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars.—Awards of reinforcing steel bars were the lightest in over six weeks. While a fair number of small lettings were noted, calling for lots of from 20 to 40 tons, larger contracts were limited to four projects. In addition to the tonnage mentioned above, the Truscon Steel Co. took 130 tons for a Science Hall in Reno, Nev. Bids were opened this week on 1150 tons for the West Garfield Street bridge. Prices on out-of-stock material in the San Francisco district continue unchanged at 2.30c. a lb., base, on carload lots and up to 2.60c. on smaller tonnages. Los Angeles prices are $2 a ton higher. Merchant bar steel is quoted at 2.35c. a lb., c.i.f.

Plates.—Of special interest to plate mill representatives and fabricators was the announcement that bids would be called for next week on a pipe line at Everett, Wash., calling for close to 10,000 tons. Bids open Aug. 7 on 200 tons of riveted steel pipe for Bremerton, Wash., and on Aug. 8 for 2000 tons for a surge tank and penstock for Tacoma, Wash. The General Petroleum Corporation plans to erect two odd-size 60,000-bbl. tanks in San Pedro, Cal., and these tanks will take a total of 460 tons. Prices appear firm at 2.35c., c.i.f.

Shapes.—Awards of structural steel shapes and plates so far this year are just short of the 200,000-ton mark, while for the same period a year ago less than 100,000 tons had been booked. The only award of importance went to Dyer Brothers and called for 100 tons for a factory addition in San Jose, Cal. Bids were opened this week on 950 tons for the West Garfield Street bridge, Seattle. Other new projects include 2400 tons for a viaduct over the Chicago, Milwaukee, St. Paul & Pacific tracks on Eleventh Street, Tacoma, and 300 tons for the Sommer-Kaufmann store on Market Street, San Francisco. During April consumers in the Los Angeles district imported over 2600 tons of shapes, the largest tonnage in over a year. Plain domestic material remains firm at 2.35c., c.i.f.

Cast Iron Pipe.—For the first time this year cast iron pipe awards were confined to lots of less than 100 tons. Demand is never particularly strong at this time of the year. Pending business does not exceed 3000 tons. Bids open on Aug. 7 for 875 tons of 10 to 24-in. Class B or riveted steel pipe for Bremerton, Wash. Alturas, Cal., will open bids Aug. 15 for 199 tons of 4 to 8-in. Class B pipe. Imports of foreign cast iron pipe during April totaled 1148 tons, compared with 2518 tons for the previous month and 1935 tons for April, 1928. Of this total over 1100 tons came from French makers and was divided between Seattle and Los Angeles users.

Steel Pipe.—Movement of standard steel pipe is holding up well, though confined to unimportant tonnages. The Southern Counties Gas Co., Los Angeles, is asking for bids on the construction of a pipe line from Laguna through San Clemente to San Diego County, and plans to furnish the contractors with 65,000 ft. of 12¾-in. O. D. gas pipe. Tubular imports during April were the lightest in over two years and aggregated 606 tons, compared with 3280 tons for March and 4907 tons for April a year ago.

Coke.—The coke market reflects the same quiet condition noted in the pig iron market, with sales and inquiries, for the most part, involving unimportant tonnages. One large importer of foreign coke has just unloaded 4000 tons of English beehive and by-product coke on the Coast, which was distributed among consumers in Los Angeles, San Francisco, Seattle and Vancouver. English beehive coke is quoted at $16 to $17 a net ton, delivered incoming dock, while by-product material ranges from $12.50 to $13.50 a net ton. During April coke imports totaled 3436 tons, compared with 2624 tons for the preceding month and 3818 tons for April, 1928. Of the total, 2000 tons came from the United Kingdom and 1300 tons from the Netherlands.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, ⅞-in. and over	3.15c.
Small angles, under ⅞-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.66c.
Black sheets (No. 24)	4.30c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, ½-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c't'd nails, 100 lb. keg	3.40

Birmingham

Rail-and-Steamer Rates on Pig Iron Go Into Effect—Steel Demand Above Usual Summer Level

BIRMINGHAM, Aug. 6.—Pig iron producers are more optimistic over the market outlook than they have been in several weeks. There has been steady buying for third quarter, and more of the larger melters have covered their requirements. The probable make is estimated to be over 80 per cent sold. Shipments to district consumers have been averaging close to production. One company reports that July shipments exceeded output by a small margin. Present indications are that August shipments will show a gain over those of July. The new combination rail-and-steamer rates to Eastern ports became effective Aug. 1. They are $5 a ton to Baltimore, $5.25 to Philadelphia, $5.50 to New York and $5.75 to Boston, representing reductions ranging from 76c. for the Baltimore rate to $1.16 for the Boston rate. Several important tonnages are under option to these points, but actual shipping orders so far have been few and have involved small tonnages. Southern basic iron is said to have been quoted, under the new transportation rates, at a delivered price that figures back as low as $13, Birmingham. No. 2 foundry continues to be sold at $14.50, Birmingham, though concessions of 50c. a ton are reported in competitive territories. Of the 17 district furnaces active, nine are on foundry, seven on basic and one on recarburizing iron. The Republic Iron & Steel Co. will blow out its No. 1 furnace this month for repairs.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$14.50
No. 1 fdy., 2.25 to 2.75 sil.	15.00
Basic	14.50

Finished Steel.—The margin between bookings and shipments continues to diminish slightly, but is still larger than it has been at this season in a number of years past. Despite the decline in inquiries in the past two or three weeks, the volume is sufficient to indicate that the midsummer slump, which usually reaches its lowest point in August, will be much less noticeable than it has been in any previous postwar year. The sheet buying movement that began about the middle of July is still under way. Plates and structural shapes are next in activity. New business in wire product is at the low point of the year, but is better than at this time last year. Shipments of wire products are slower. New bookings of structural steel fabricators during the past week were light. Prospective work, however, includes steel for a 14-story office building addition at Atlanta, an 18-story office building at Birmingham and for the new mills of the Gulf States Steel Co. at Alabama City. New business in reinforcing bars is off slightly. Three open-hearth furnaces were taken off for repairs last week, leaving 19 active out of a total of 23 in the district.

Cast Iron Pipe.—New business in pressure pipe during the past two weeks has been considerably below the average of the few weeks preceding, and unfilled tonnage is being worked off. The project at West Greenville, S. C., requiring about 300 tons, has been awarded to the American Cast Iron Pipe Co. About 12,000 ft. of 10-in. pipe was divided between the American Cast Iron Pipe Co. and the National Cast Iron Pipe Co. Bids will be opened this week for about 15,000 ft. of 6 and 8-in. pipe for Nashville, Tenn. Newton, N. C., will open bids Aug. 13 for 6000 ft. of 8-in. pipe. A project at Gadsden, Ala., to be let Aug. 15, will require about 3000 ft. of 12 to 18-in. pipe. Shipments approximate production, which is estimated to be over 80 per cent of capacity. Prices remain at $37 to $38 a net ton, Birmingham, for 6-in. and larger sizes.

Coke.—The movement of foundry coke under contract compares favorably with that of this time last year. Shipments are steady and operations stable. Prices are unchanged at $5 a net ton, Birmingham.

Old Material.—Inquiries and sales in the steel grades have improved. Specifying on contracts has increased and present shipments are above the July average. Prices for the steel grades are firmer, but unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$12.50
Scrap steel rails	12.50
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	$11.50 to 12.00
Steel axles	21.00
Iron axles	23.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	14.00 to 15.00
No. 1 cast	13.50
Tramcar wheels	13.00
Cast iron carwheels	12.50 to 13.00
Cast iron borings, chem	13.50 to 14.00

Youngstown

August Steel Shipments May Show 5 to 10 Per Cent Decline —September Prospects Bright

YOUNGSTOWN, Aug. 6.—Mahoning Valley steel mills are beginning their sixth month of practically capacity operations, and many departments have had sufficient specifications to schedule the mills fully through August. A slight decrease in the number of open-hearth furnaces in operation has not curtailed the production of crude steel to any great extent, but it is apparent that the capacity of the district is no longer being severely taxed to supply finishing mills, and the present month will probably see a decline of from 5 to 10 per cent in total steel shipments.

In forecasting the future, opinion is practically unanimous in the belief that September will bring an upturn. Large consuming industries in and near the Valley district plan very heavy fall operations, and increasing specifications for sheets, strip and other products used by the automobile industry make an improvement in demand from this channel almost certain. Pipe business has also improved materially in the last two months, and large tonnages now in prospect lead to the belief that the best months of the year are still ahead of that department. One large Valley interest has its lap-weld mill entirely scheduled during August, and although the demand for standard butt-weld pipe has failed to become very active this year, the pipe industry as a whole seems to be entering a period of marked prosperity.

Sheet mills in the district are fully scheduled throughout the present month. On some sizes and finishes of sheets, rollings cannot be accommodated until the middle of September. Strip backlogs are not nearly so heavy and, although one large maker of cold-rolled strip is booked up for at least a month, deliveries on the hot-rolled material can be made in about two weeks. On tin plate, specifications for as long as two weeks' rollings are the exception, the majority of the mills operating on a week-to-week basis. Plate business is exceptionally good, but bars are quiet.

Prices seem to have shown some improvement in the last two weeks. On black sheets the 2.85c., Pittsburgh, price is becoming established and mills are considering another attempt to get the market back to 2.95c. Youngstown makers confirm the report that galvanized sheets are now being sold to consumers as well as to jobbers at 3.50c., Pittsburgh, although they are holding to 3.60c. in most instances. Wide strip mills in the district are not well occupied, and less favorable market conditions have brought out concessions of $2 and even $4 a ton on heavy-gage blue annealed sheets, which are still quoted at 2.20c., Pittsburgh, for No. 10. On hot-rolled strip, prices are holding well at 1.90c. and 2c., Pittsburgh. The cold-rolled strip market has gained strength and the minimum of 2.75c., Pittsburgh or Cleveland, which wavered recently as the result of sales to Detroit tubing manufacturers at 2.65c., is now better established. In fact, one maker is again quoting 2.85c. on all small orders and has booked some business at that figure. Other prices are holding and, with a marked summer decline in business now definitely averted, mills are disposed to maintain a firm attitude.

The pig iron market is very quiet and, although shipments are keeping up, business being booked from week to week is of small proportions. Five merchant stacks are being operated in the Mahoning and Shenango Valleys, the Cherry Valley furnace of the Davison Coke & Iron Co. having been scheduled to go into blast early this week, offsetting the blowing out of that company's Claire furnace on July 22. It is also reported that the McKeefrey furnace at Leetonia, Ohio, recently bought by the Atlas Steel & Supply Co., Cleveland, may soon be put in operation.

The scrap market shows unusual strength and, with sales of heavy melting steel having been made at $19 and compressed sheets at $18.50, it is quotable on a par with the Pittsburgh market. This is due to the fact that steel companies in the district are taking large tonnages and to a scarcity of the better grades.

Canada

Pig Iron and Scrap Quiet— Structural Steel Active

TORONTO, ONT., Aug. 6.—While the demand for foundry and malleable pig iron was without special feature during the week, total sales continued in good volume. Some decline in sales was reported by local blast furnace representatives, due chiefly to the civic holiday on Aug. 5, but this is believed to be only a temporary slump. July pig iron sales dropped somewhat below those of June, but were in much larger volume than those of July a year ago. Forward contracting is at a standstill. Melt is holding at its high level, with prospects of being maintained until the end of the year. Production of pig iron remains large,

with seven stacks in blast. Pig iron prices are firm but unchanged.

Prices per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$24.60
No. 2 fdy., sil. 1.75 to 2.25	24.10
Malleable	24.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$26.00
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	24.50

Imported Iron, Montreal Warehouse

Summerlee	$33.50
Carron	33.00

Structural Steel.—Bridge and building construction is increasingly active. Demand is not confined to any one locality, but is general throughout Canada. Several substantial structural steel tonnages were awarded during the week; others will be placed soon.

Old Material.—While there was some improvement in sales during the week, business continues to be affected by the summer holiday season. Current demand is almost entirely of a spot nature, with no forward delivery contracts reported by local dealers. Prices are unchanged.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$10.00	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel turnings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
	Per Net Ton	
No. 1 mach'ry cast	$16.00	....
Stove plate	12.00	....
Standard carwheels	15.00	....
Malleable scrap	14.00	....

Buffalo

Pig Iron Producers in Stronger Position—Steel Output Undiminished—Advances in Scrap

BUFFALO, Aug. 6.—One Buffalo furnace has announced that it is practically out of the market on pig iron for Eastern delivery for the next 60 days. On the business it is considering, nothing less than $18.50, base, is being quoted, with full differentials. Considerable iron is being booked privately without the sending out of general inquiries. In the last few days a local producer has booked 3000 to 4000 tons in scattered lots of 100 to 300 tons. Eastern inquiries for 500 tons of foundry and malleable and for 1000 tons of foundry and malleable have been closed here. The Eastern Malleable Iron Co. is in the market for 5000 tons of malleable, following the withdrawal of a previous inquiry. The American Radiator Co. has bought a tonnage of iron for Southern and Middle Western plants and is understood to be no longer in the market. One Buffalo furnace reports being entirely out of stock iron, and another reports that its stock sheet is lower by 4000 tons than it has been any time this year.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$19.50
No. 2X fdy., sil. 2.25 to 2.75	20.00
No. 1 fdy., sil. 2.75 to 3.25	21.00
Malleable, sil. up to 2.25	20.00
Basic	18.50
Lake Superior charcoal	27.28

Finished Steel.—Operations of steel mills thus far in the third quarter have been at the same pace as during the previous part of the year, and producers see no signs of let-up in the immediate future. The Lackawanna plant of the Bethlehem Steel Co. is operating 22 out of 24 open-hearth furnaces, with the roughing mills on three 8-hr. shifts and the finishing mills on two 10-hr. shifts. The Donner Steel Co. is operating seven out of 10 open-hearth furnaces, and recent alterations make these seven equivalent to eight previously. Most of the mills are on double turn. A considerable volume of reinforcing bars has been booked in small lots. One seller has accumulated about 2000 tons of this type of business during the past week, with most of the orders running under 25 tons. The general contract for the new State office building to be built in Buffalo, has not been awarded, but the low bidder has been announced. This probably will require about 860 tons of fabricated structural steel.

Old Material.—Sales of No. 1 heavy melting steel at $17.50 are reported. Pittsburgh and Youngstown points are understood to be paying $18.50 for No. 1 grade, and outside demand for No. 1, No. 2 heavy melting steel and hydraulic compressed sheets is generally strong, so that very little of this material is coming into this market. Dealers report a marked shortage of No. 1 heavy melting steel. They are offering at high as $14.75 for No. 2 steel on a $15 order placed some time ago. Strong demand exists at Weirton, W. Va., for No. 2 heavy melting steel and dealers are offering $17, delivered Weirton, for this material. No. 1 machinery cast is more active, a number of small sales at $16 being reported. The 2000-ton order for stove plate placed here last week was filled without difficulty, as supplies were heavier than usual. Two other sales of stove plate at $13.50 were reported. One buyer was able to obtain a certain amount of distress stove plate at $13. Sales of knuckles and couplers, coil and leaf springs and rolled steel wheels have been made at $19.50. Sales of cast iron borings at $11.50 are reported, and this commodity seems to be scarce. General production of scrap dropped off in this territory during July.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb	3.75

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$17.25 to $17.50
No. 2 heavy melting steel	14.75 to 15.00
Scrap rails	16.50 to 17.00
Hydraul. comp. sheets	14.50 to 14.75
Hand bundled sheets	12.00 to 12.50
Drop forge flashings	14.25 to 14.50
No. 1 busheling	15.50 to 16.50
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	7.50 to 7.75
No. 1 railroad wrought	13.00 to 13.50
Acid Open-Hearth Grades:	
Knuckles and couplers	19.00 to 19.50
Coil and leaf springs	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
Low phos. billet and bloom ends	20.00 to 20.50
Electric Furnace Grades:	
Short shov. steel turnings	12.00 to 12.50
Blast Furnace Grades:	
Short mixed borings and turnings	11.00 to 11.50
Cast iron borings	10.50 to 11.00
No. 2 busheling	10.00 to 10.50
Rolling Mill Grades:	
Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00
Cupola Grades:	
No. 1 machinery cast	16.00 to 17.00
Stove plate	13.00 to 13.50
Locomotive grate bars	12.50 to 13.00
Steel rails, 3 ft. and under	19.00 to 19.50
Cast iron carwheels	14.00 to 14.50
Malleable Grades:	
Industrial	18.00 to 18.50
Railroad	18.00 to 18.50
Agricultural	18.00 to 18.50
Special Grades:	
Chemical borings	12.50 to 13.50

American Puddled Iron Co. to Take Over Warren Plant

YOUNGSTOWN, Aug. 6.—Effective Jan. 1, 1930, the American Puddled Iron Co. will take possession of its plant at Warren, Ohio, which has been under lease for three years to the A. M. Byers Co., Pittsburgh. At this plant, the Byers company has successfully developed the Aston process of producing puddled iron. The American Puddled Iron Co. will continue operations at this property and plans eventually to install sheet mills.

Under the terms of its arrangement with the A. M. Byers Co., the American Puddled Iron Co. is licensed to manufacture iron by the Aston process, and to convert it into any finished product except pipe. The American Puddled Iron Co. also comes into possession of all equipment at the Warren plant that has been used by the Byers company in its operations.

At the start the company will produce wrought iron in such semi-finished forms as sheet bars, muck bars, billets and blooms. Finishing capacity in the form of sheet mills will be installed in due course. The Warren plant has a present capacity of 5000 to 6000 tons of wrought iron per month. It includes a site of 470 acres, served by the Baltimore & Ohio Rail-

road, with connections with the Erie and Pennsylvania; several factory buildings, a 350-ton cupola, a three-high blooming mill and a three-high finishing mill. All of the equipment is electrically operated.

The capital structure of the American Puddled Iron Co. consists of 35,000 shares of $100 par stock, of which 29,154 shares have been issued. No new financing is contemplated for the beginning of operations.

At the end of this year the Byers company will transfer its manufacturing operations from Warren to its new plant at Ambridge, Pa.

The American Puddled Iron Co. is an outgrowth of the Youngstown Steel Co., originally formed by the late E. L. Ford and associates to develop the Ford process of manufacturing puddled iron. Mr. Ford died before his process was perfected for commercial purposes and the Warren plant was subsequently leased to the Byers company.

St. Louis

Pig Iron Sales Improve—Scrap Dealers Continue to Bid Up Prices—Steel Output Sustained

ST. LOUIS, Aug. 6.—Sales of pig iron increased during the week, the volume booked by the St. Louis Gas & Coke Corporation being 5000 tons. Of this, 3800 tons for an Indiana equipment builder, 500 tons for a Quincy, Ill., melter and 400 tons for an Illinois equipment builder, were for shipment over the remainder of 1929, while three orders for 100 tons each were for prompt delivery. There is believed to be a heavy tonnage of iron to be placed for the rest of this quarter, but melters are still postponing action on account of the uncertainty of the price situation. The melt in the district is said to be off on account of hot weather. The local producer has made no change in quoted prices, but is said to be making concessions on high phosphorus iron in competition with the Southern makers.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$20.00
Malleable, f.o.b. Granite City	20.50
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.92
Northern malleable, deliv'd	22.16
Northern basic, deljv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Finished Steel.—Demand for black and galvanized sheets during July was up to that of June, while specifications for blue annealed, tin plate and plates were not as great as in the preceding month, it is reported by the Granite City Steel Co. The company is operating all units as near to capacity as the weather permits. The structural steel trade is quiet. The only new reinforcing bar project pending is McMillan Hospital of the Washington University group, which will require approximately 500 tons.

Coke.—Buying of domestic coke is satisfactory for the season. Foundry grades are said to be a bit easier, because of the lighter melt in the district. Furnace coke is being taken by smelters in the district according to specifications.

Old Material.—Dealers continue to bid up prices, and some items are from 50c. to $1 a ton higher. Buying by the mills is not heavy, but sellers believe that higher prices will prevail. There has been an improvement in the movement of old material into this market, but it was slight. Railroad lists: Pennnsylvania, 55,000 tons; Baltimore & Ohio, 14,000 tons; St. Louis-San Francisco, 20 carloads, and Chicago & Eastern Illinois, nine carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$14.00 to $14.50
No. 2 heavy melting or shoveling steel	13.25 to 13.75
No. 1 locomotive tires	15.50 to 16.00
Miscel. stand.-sec. rails including frogs, switches and guards, cut apart	16.75 to 17.25
Railroad springs	18.50 to 19.00
Bundled sheets	10.00 to 10.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	10.00 to 10.50
Cast iron borings and shoveling turnings	9.50 to 10.00
Iron rails	15.00 to 15.50
Rails for rolling	17.25 to 17.75
Machine shop turnings	9.00 to 9.50
Heavy turnings	10.00 to 10.50
Steel car axles	19.00 to 19.50
Iron car axles	27.50 to 28.00
Wrot. iron bars and trans.	22.00 to 22.50
No. 1 railroad wrought	13.50 to 14.00
Steel rails, less than 3 ft.	19.00 to 19.50
Steel angle bars	14.50 to 14.75
Cast iron carwheels	14.50 to 15.00
No. 1 machinery cast	15.00 to 15.50
Railroad malleable	15.50 to 16.00
No. 1 railroad cast	15.00 to 15.50
Stove plate	12.50 to 13.00
Agricult. malleable	15.00 to 15.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shaftings, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	3.95c.
Boiler rivets	3.95c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb	50

Cincinnati

Mill Operations Sustained—Scrap Strong, Pig Iron Dull

CINCINNATI, Aug. 6.—Consumers of pig iron are wary about entering the market for large quantities and are purchasing only enough material to maintain production, thus causing the volume of new business of district furnaces to decline noticeably. Of course, a recession in buying activity is always looked for at this time of the year, but the situation is further complicated by the unsettled condition of the Southern market, which in a few instances has caused Northern furnaces to figure closely to take business. Another factor is the withdrawal of automobile manufacturers from the market, pending the bringing out of new models, but this is expected to disappear in about 30 days. There is no inquiry of note before the trade.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$19.89 to $20.39
Ala. fdy., sil. 1.75 to 2.75	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material.—Although the general sheet demand during the past week has been maintained at a high level for midsummer, new business was not abreast of production and district sheet mills reduced backlogs further. Deliveries, however, are still extended and, with the highway and roofing demand increasing, mill operators do not look for much additional improvement in the situation. The leading interest in this district reports that two of its units are booked approximately three months in advance and all other units, except the cold-rolled strip mill, are maintaining capacity production to keep pace with

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized heets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain per 100 lb.	8.75
	Net per 100 Ft.
Lap-weld steel boiler tubes, 2-in.	$16.00
4-in.	33.00
Seamless steel boiler tubes, 2-in.	17.00
4-in.	34.00

demand. With a reawakening of the automotive demand the latter part of this month, it is expected that interest in cold-rolled strip again will increase. Improvement in the price situation on galvanized sheets is indicated in reports that concessions heretofore granted by certain mills to Southern roofing manufacturers are being refused.

Coke.—District sellers of by-product foundry coke report that specifications during July were greater than in any month since March, when an acute situation in southern Michigan caused a very heavy demand. Indications for this month, however, are that foundries will ease up on specifications, primarily because of the decrease in automotive demand. New business is still very quiet and, except for a few carloads, no new bookings have been announced.

Old Material.—While the market is still firm, as indicated by the continued steadiness of prices and a further advance of 25c. in heavy melting steel, consumers are not buying old material in large quantities. Mills are taking shipments on old contracts, but as these terminate, new purchases are made only to cover requirements for short periods and in some instances for immediate use. The Norfolk & Western Railway is offering 4300 tons and the Pennsylvania has announced a list of 50,000 tons.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$13.75 to $14.25
Scrap rails for melting	14.00 to 14.50
Loose sheet clippings	9.00 to 9.50
Bundled sheets	11.00 to 11.50
Cast iron borings	9.25 to 9.50
Machine shop turnings	8.50 to 8.75
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.00 to 7.50
Rails for rolling	14.50 to 15.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	13.75 to 14.25
Short rails	18.50 to 19.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	19.25 to 19.75
No. 1 railroad cast	15.25 to 15.75
Burnt cast	10.25 to 10.75
Stove plate	10.25 to 10.75
Brake shoes	10.25 to 10.75
Agricultural malleable	14.25 to 14.75
Railroad malleable	15.25 to 15.75

Boston

Reduced Sales of Pig Iron—Buffalo Quotations Advance—Scrap Easier on Increasing Supply

BOSTON, Aug. 6.—Pig iron sales the past week dropped off, amounting to less than 5000 tons, contrasted with slightly more than that amount the previous week. They included 1000 tons of low phosphorus to a Massachusetts machinery manufacturer by a furnace east of Buffalo, and the remainder was in small tonnages. Another Massachusetts machinery manufacturer has yet to cover on 1000 tons of No. 2X and No. 1X. No other sizable inquiry is in the market. Buffalo furnace prices unquestionably are firmer than they were a fortnight ago. Numerous small lots of No. 2X iron sold the past week at $18.50 a ton, furnace, and the lowest price offered so far on the 1000-ton open inquiry has been $18. The furnace making that price is on an $18-a-ton base, but in this instance waived the differential on the No. 2X. Iron made east of Buffalo the past week sold at an advance of 25c. to 50c. a ton, in some cases.

Foundry iron prices per gross ton deliv'd to most New England Points:

†Buffalo, sil. 1.75 to 2.25	$22.28 to $22.78
‡Buffalo, sil. 2.25 to 2.75	22.78 to 23.28
*Buffalo, sil. 1.75 to 2.25	22.91 to 23.41
*Buffalo, sil. 2.25 to 2.75	22.91 to 23.91
East. Penn., sil. 1.75 to 2.25	23.65
East. Penn., sil. 2.25 to 2.75	24.15
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
Ala., sil. 1.75 to 2.25	21.41 to 23.27
Ala., sil. 2.25 to 2.75	21.91 to 23.77

Freight rates: $4.91 all rail from Buffalo, and $4.28 rail and water; $3.65 from eastern Pennsylvania; $5.21 all rail from Virginia; $6.91 to $8.77 from Alabama.

*All rail rate.
†Rail and water rate.

Shapes and Plates.—Mills are holding firmly at 1.90c. to 2c. a lb., base. Pittsburgh, on plates and standard shapes and are well booked ahead. Plate deliveries are still uncertain, but specifications on shapes are coming forward on schedule. The New England Structural Co. is the low bidder on 300 tons of steel for the fire station, Bowdoin Square, Boston, but the cost exceeds the appropriation. The aggregate tonnage placed the past week in small fabricating jobs in Boston ran about 800 tons. Competition among fabricators is keen and New York State firms have invaded the New England field, taking jobs of as small as 25 tons.

Reinforcing Steel.—Billet steel bars continue to sell in small tonnages. While competition among sellers is keener than at any previous time this year, they are holding firmly to 2.66½c., base, from stock. The 250 to 300 tons required for the North Station hotel will probably close this week, as well as better than 700 tons for a downtown office building. Rail steel bars are moving in limited amounts at concessions from the general 2.26½c., base, delivered common Boston freight rate points price.

Coke.—Little change is noted in the by-product foundry coke situation. Specifications against last half contracts are holding up well and the price remains at $11 a ton, delivered within a $3.10 freight rate zone.

Old Material.—Old material is coming out more freely and mills are specifying against contracts more liberally. Consequently the general scrap price structure does not appear so strong as heretofore. Sales of No. 1 heavy melting steel at $13 a ton have practically disappeared and $12.75, on cars shipping point is now the recognized top price. Quotations on T rails have dropped noticeably due to increased supplies. One dealer is paying $15 a ton, on cars shipping point for shafting, but the average going price is $14. Steel turnings are off about 10c. a ton. In contrast with the general trend of values, bundled skeleton, forge flashings and blast furnace borings and turnings are doing a little better. A steamer has just finished loading 3300 tons of scrap here for Danzig. Another steamer is due here Aug. 7 to take 1200 to 1400 tons for the same port. The four cranes on the local loading dock heretofore out of commission are working and the next steamer will load quickly.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$12.50 to $12.75
Scrap T rails	11.50 to 12.00
Scrap girder rails	11.00 to 11.50
No. 1 railroad wrought	11.00 to 11.50
No. 1 yard wrought	9.00 to 9.50
Machine shop turnings	6.50 to 7.00
Cast iron borings (steel works and rolling mill)	6.50 to 6.60
Bundled skeleton, long	10.00 to 10.50
Forge flashings	10.00 to 10.50
Blast furnace borings and turnings	6.10 to 6.50
Forge scrap	9.00 to 9.25
Shafting	14.00 to 15.00
Steel car axles	18.00 to 19.00
Wrought pipe 1 in. in diameter (over 2 ft. long)	9.75 to 10.00
Rails for rolling	12.50 to 13.00
Cast iron borings, chemical	10.00 to 10.25
Prices per gross ton deliv'd consumers' yards:	
Textile cast	$14.50 to $15.00
No. 1 machinery cast	15.00 to 15.25
No. 2 machinery cast	13.00 to 13.25
Stove plate	11.00 to 11.50
Railroad malleable	18.50 to 19.00

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

An evening course in Diesel and oil engines has been announced by the Polytechnic Institute, Brooklyn, N. Y. Lectures will be held every Tuesday evening, beginning with the last Tuesday of September. Detailed information may be obtained by addressing the institute, 99 Livingston Street, Brooklyn.

Non-Ferrous Metal Markets

Largest Domestic Copper Sales Since Middle of March

NEW YORK, Aug 6.

Copper.—After an extended period of dullness, copper sales turned sharply upward the past week. Domestic consumers resumed buying on a liberal scale, placing orders for more than 30,000 tons. This constituted the largest week's business since the middle of March. Concurrent with the renewal of activity in the domestic market were substantial bookings abroad, which totaled over 2000 tons daily. Practically all purchases, both domestic and foreign, were for delivery in the next 30 days. The spurt of buying is attributed to the fact that consumers allowed stocks to diminish to the point where immediate requirements demanded the ordering of fresh material. This action on the part of users has broken a deadlock during which attempts were made by them to reduce prices by refraining from buying and thereby forcing producers, hungry for business, to offer inducements in the form of lower quotations. The latest developments are regarded as a victory for producers in their efforts to maintain the market at the present level. Outstanding during the week was the resumption of the solicitation of orders by the primary producers, who lately have been leaving the market to custom smelters. Sellers are convinced that the substantial bookings of the past week do not represent a flurry of buying, but are a forerunner of a steady flow of business from both domestic and foreign consumers during the month of August. Electrolytic copper is firm at 18c., delivered in the Connecticut Valley, and at 18.30c., c.i.f. usual European ports. Lake copper remains at 18c. to 18.12½c., delivered.

Copper Averages.—The average price of Lake copper for July, based on daily quotations in THE IRON AGE, is 18.12½c., delivered New York. The average price of electrolytic copper is 17.75c., refinery, or 18c., delivered in the Connecticut Valley.

Tin.—Despite the scarcity of orders, which totaled only 500 tons in the past week, the Straits tin market has shown surprising steadiness. In addition to the lack of demand on the part of buyers, the week was made even more dull by the fact that Mon-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Aug. 6	Aug. 5	Aug. 3	Aug. 2	Aug. 1	July 31
Lake copper, New York	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	47.25	47.25	....	47.125	47.125	47.25
Zinc, East St. Louis	6.80	6.80	6.80	6.80	6.80	6.80
Zinc, New York	7.15	7.15	7.15	7.15	7.15	7.15
Lead, St. Louis	6.55	6.55	6.55	6.55	6.55	6.55
Lead, New York	6.75	6.75	6.75	6.75	6.75	6.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

Prices on rolled non-ferrous products are unchanged from those prevailing one week ago.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—
- High brass ..... 23.25c.
- Copper, hot rolled ..... 26.75c.
- Zinc ..... 10.25c.
- Lead (full sheets) ... 11.00c. to 11.25c.

Seamless Tubes—
- High brass ..... 28.25c.
- Copper ..... 29.25c.

Rods—
- High brass ..... 21.25c.
- Naval brass ..... 24.00c.

Wire—
- Copper ..... 19.87½c.
- High brass ..... 23.75c.

Copper in Rolls ..... 26.75c.
Brazed Brass Tubing ..... 30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

- Sheets, 0 to 10 gage, 3 to 30 in. wide ..... 33.00c.
- Tubes, base ..... 42.00c.
- Machine rods ..... 34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	11.35c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brazed Brass Tubes	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c. to 31.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brazed Brass Tubes	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.

New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	48.50c. to 49.50c.
Tin, bar	50.50c. to 51.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	7.75c. to 8.25c.
Lead, American pig	7.50c. to 8.00c.
Lead, bar	9.50c. to 10.00c.
Antimony, Asiatic	10.50c. to 11.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy,	24.00c. to 25.00c.
Babbitt metal, commercial grade,	25.00c. to 35.00c.
Solder, ½ and ½	31.00c. to 32.00c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	52.25c.
Tin, bar	54.25c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig	7.25c. to 7.50c.
Lead, bar	9.75c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	18.75c.
Babbitt metal, high grade	56.50c.
Solder, ½ and ½	31.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.	16.00c.
Copper, hvy. and wire	14.50c.	15.75c.
Copper, light and bottoms	12.50c.	13.75c.
Brass, heavy	8.50c.	9.50c.
Brass, light	7.50c.	8.50c.
Hvy. machine composition	12.00c.	13.00c.
No. 1 yel. brass turnings	9.75c.	10.50c.
No. 1 red brass or compos. turnings	11.25c.	12.25c.
Lead, heavy	5.25c.	5.75c.
Lead, tea	4.25c.	5.25c.
Zinc	3.50c.	4.25c.
Sheet aluminum	14.00c.	16.00c.
Cast aluminum	12.25c.	14.25c.

day was a bank holiday in London so that trading activities were suspended there. Practically all buying has been for August and September delivery. Spot Straits tin has fluctuated but little during the week and was quoted today at 47.25c., New York. The London market is firm, but prices have fallen off slightly. Spot standard is quoted at £212 17s. 6d., future standard at £216 17s. 6d. and spot Straits at £216 7s. 6d. The price at Singapore is steady at £220 5s.

Zinc.—Prime Western zinc is firm at 6.80c., East St. Louis, but orders have been confined to from one to two carloads each. Figures published by the American Zinc Institute reveal that zinc stocks increased about 7200 tons during July, a development which has tended somewhat to weaken the market. However, producers declare that several large consumers have allowed stocks to run down materially and that they will have to make sizable purchases the moment that demand for their product picks up.

Lead.—There is a stronger undertone to the market. Consumers have been buying in larger quantities and thereby have added strength to prices. Orders for August delivery have been taken at 6.55c., St. Louis, but producers, at least in some cases, are asking 6.60c. for September delivery. The leading interest continues to quote 6.75c., New York.

Antimony.—Consumers have been purchasing steadily in small lots and spot metal has advanced to 8.75c. with futures selling at 8.62½c., duty paid, New York. Imports of Chinese metal during August are estimated at about 500 tons. Since demand is normally about 800 tons monthly and since only small stocks are in warehouses, there is a strong possibility that prices may advance. In several cases dealers now are trying to get 6.00c. for spot metal.

Nickel.—Ingot nickel is quoted at 35c. a lb., shot nickel at 36c. and cathodes of electrolytic nickel at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is priced at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Aug. 6.—Spot sales are in good volume. Prices are steady except for a small reduction in quotations on zinc. Purchasers of old metals are more numerous than a week ago.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 48c.; lead, 6.65c.; zinc, 6.87½c.; in less-than-carload lots, antimony, 9.62½c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3.25c.; pewter, No. 1, 24.50c; tin foil, 26c.; block tin, 36c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Bethlehem's Report to Employees

President Grace Attributes Bright Outlook to Worker Relations—Has Made Plans for Revamping Properties

NEVER was the future success of the Bethlehem Steel Corporation better assured than it is today, according to Eugene G. Grace, president, in a statement to the company's employees. Mr. Grace's statement was included in a report to the employees—similar to the company's yearly reports to stockholders—covering the annual conferences which have just been concluded between the management and representatives of the employees.

"I do not hesitate to say," Mr. Grace states, "that this happy outlook is due largely to our persistent adherence to the principle of good management, which recognizes above everything else that a cooperative relationship between employer and employee is essential to the success of any large industrial undertaking.

"The steel industry as a whole is experiencing the greatest demand in its history. Bethlehem has been operating for many months under a demand in excess of its rated capacity. New records are being established in all branches of the business. And because the company more than five years ago undertook a comprehensive program of rebuilding and rounding out its plants, Bethlehem was ready to meet this anticipated demand, not only more economically but also in larger quantities with a complete line of commercial steel products for every one of steel's expanding uses.

"Rising almost from obscurity 25 years ago, Bethlehem today occupies a new position of financial security and commercial leadership. The company's progress has enabled us not only to provide steadier work for our employees than at any time in recent years, but also to resume payment of dividends to our common stockholders after five years' interruption, and to share with them in other ways the company's prosperity. The results which have been accomplished should be especially gratifying to the employees—so many of whom are also stockholders—for the evidence is plain that this achievement means work well done all along the line."

The report points out that the results achieved may be attributed to those activities which are jointly operated by employees and management, namely, employee representation, savings and stock ownership, pensions, relief, accident prevention, home ownership aid, etc. The report adds that weekly earnings of Bethlehem employees are today over 20 per cent higher than the average weekly earnings in 24 major industries.

Plans have been made, it is stated, for further revamping of Bethlehem's properties to enable the company to keep pace with the growing demand for its products.

Obituary

WILLIAM PIGOTT, whose death at Vancouver, July 19, was mentioned in this column last week, was born 69 years ago in New York, but received his school education in Ohio. He went to Seattle in 1895 and had long been a conspicuous figure in steel manufacture, developing the Seattle properties of the Pacific Coast Steel Co., of which he was for years vice-president. He was president of the Pacific Foreign Trade Council in 1925 and 1926 and was a director of the Dexter Horton National Bank of Seattle and a member of India House, New York.

—

JOSEPH E. HUBINGER, president, Eastern Machine Screw Corporation, New Haven, Conn., died at his home in that city July 30, aged 71 years. He was born in Madison, Ind., and went to New Haven in 1882, where he started in business with his brothers.

—

WILLIAM M. C. FOSTER, vice-president and general manager of the Mead Cycle Co., Chicago, died July 31, at his home in Lake Bluff, Ill., aged 53 years.

EDWARD NEWBEGIN, president, Multnomah Iron Works, Portland, Ore., died suddenly July 25, in that city.

—

CHARLES H. SCHRODER, secretary of the Murray Iron Works Co., Burlington, Iowa, for 27 years, died July 29, aged 62 years. He had been connected with the company for 47 years.

—

JOSEPH D. MARKS, Cleveland dealer in iron and steel scrap, died at Battle Creek, Mich., Aug. 1, following an operation, aged 48 years. Several years ago, he, with H. R. Fishel, organized the Fishel & Marks Co. About four years ago, Mr. Marks took over the business and later the company was discontinued. Since that time he had been engaged in business under his own name.

—

N. L. KENREIGH, for 20 years associated with Strong, Carlisle & Hammond Co., Cleveland, in a sales capacity in the northern Ohio territory, died at his home in Ravenna, Ohio, Aug. 1.

PERSONAL

DR. GEORGE B. WATERHOUSE, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., is spending the greater part of the summer at Sydney, Nova Scotia, and at Montreal, Quebec, at the plants of the Dominion Iron & Steel Co., a subsidiary of the British Empire Steel Corporation, Ltd.

—

E. D. SPICER, superintendent of the refrigeration department of the General Electric Co., has been made assistant manager of the Schenectady works, effective Aug. 1, according to an announcement made by C. C. Chesney, vice-president of manufacturing. Mr. Spicer was graduated from Cornell University in 1912 with the degree of mechanical engineer. He has been with the General Electric Co. since 1924.

—

ALAN KISSOCK, who invented the process for alloying molybdenum with steel by the use of calcium molybdate, has been elected vice-president in charge of production of the Climax-Molybdenum Co., 61 Broadway, New York. He was graduated from the Colorado School of Mines as a mining engineer in 1912, and for three years was engaged in the examination and management of various mines. From 1915 to 1918 he was manager of the Molybdenum Products Co., Tucson, Ariz., and then became president of the Steel Alloys Co., Los Angeles, Cal. During 1922 and 1923 he devoted his time to the examination and management of mines and then associated himself with the Climax Molybdenum Co. in 1924. Since 1924 he devoted himself to the mining and milling of molybdenum ores and to the construction and operation of plants for the production of calcium molybdate. He has also been active in promotional work in connection with the use of molybdenum steels.

—

MATTHEW M. KENNEDY has resigned as chief metallurgist and materials engineer at the United States Navy Yard, Philadelphia, to become associated with Horace C. Knerr, consulting metallurgical engineer, Philadelphia.

—

ROBERT B. MARSHALL has joined the New York sales staff of the Chain Belt Co., Milwaukee.

—

J. C. BINGHAM, heretofore assistant purchasing agent for the Sharples Separator Co., West Chester, Pa., has been appointed purchasing agent, and L. F. ARCHER has been appointed works manager, succeeding S. E. DYKE, resigned.

—

W. H. ARNOLD, formerly assistant sales manager of the Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, has been made general sales manager, succeeding C. A. ANDERSON, JR., who became president of the company on March 1. Mr. Arnold has been identified with the company since 1905.

—

W. J. BECK, for nineteen years director of research of the American Rolling Mill Co., has been appointed assistant to Charles R. Hook, general manager. Mr. Beck will have direct charge of the development in electrical steel sheets for magnetic purposes. He is widely known in this branch of the industry, having joined Armco in 1903. Graduating from Purdue University in 1896, he was for several years an electrical engineer with the Westinghouse Electric & Mfg. Co. He came to the American Rolling Mill Co. as superintendent of the electrical department and in 1910 was appointed director of research.

W. J. BECK

DR. ANSON HAYES

—

DR. ANSON HAYES has been appointed director of research of the American Rolling Mill Co., Middletown, Ohio. For the past year and a half he has been chief of the chemical division of the Armco research division. He held the chair of physical chemistry at Iowa State College for twelve years and headed that division of the large chemical department of that institution. He also taught graduate courses in thermodynamics and directed research work in the study of factors that influence the stability of iron carbide, particularly in white iron composition suitable for the manufacture of malleable iron. He is a graduate of Drake University, class 1908. His master's degree was taken at Iowa State College, and he received his Ph.D. from the University of Chicago.

—

GEORGE L. GORDON, who has been assistant general manager of sales of the Lukens Steel Co., Coatesville, Pa., has been promoted to general manager of sales, succeeding FRANK H. GORDON, now a vice-president. J. H. MCELHINNEY, assistant general superintendent of the company, has become general superintendent to succeed W. H. WARREN, recently elected vice-president and G. DONALD SPACKMAN, who has been superintendent of the flanging department, has become assistant general superintendent.

—

LEON F. PAYNE, manager of the credit department, Carnegie Steel Co., Pittsburgh, has been elected treasurer of the Oil Well Supply Co., Pittsburgh, succeeding H. H. JAMES, who was recently elected vice-president in charge of manufacturing for the Supply company.

—

R. J. TEEPLE will have charge of chain link fence sales for the Page Steel & Wire Co., following the transfer of the company's general sales department from Bridgeport, Conn., to the American Bank Building, Pittsburgh. S. B. CAIRNS will handle sales of field fence and general wire products, and welding wire and specialties will be handled by J. J. FLAHERTY. W. T. KYLE, general manager of sales for the company will maintain his headquarters at the company's general offices at 230 Park Avenue, New York.

—

CHARLES E. HAUCH has been appointed purchasing agent of the North American Refractories Co., National City Bank Building, Cleveland.

—

E. P. SEDGWICK has been re-elected president of the Chicago Hardware Foundry Co., North Chicago, Ill. Other officers elected were E. B. SHERWIN, secretary; J. W. ELLIS, treasurer; F. J. SHERWIN, vice-president and G. L. BREWSTER, assistant secretary.

—

CHARLES R. BARTON, for the past several years vice-president in charge of the seamless tube mill of Spang, Chalfant & Co., Inc., at Ambridge, Pa., has been made vice-president in charge of all operations of that company.

BOOK REVIEWS

Smelting All Metals

Principles of Metallurgy, by John L. Bray. 568 pages. Ginn & Co., Boston. Price $5.80.

This solid book by the professor of metallurgy at Purdue University has apparently been written to fill the needs of the courses given at that institution. Whether it will be adopted by other colleges will depend upon the time available for such matters. In the opinion of the reviewer, Professor Bray's book is comprehensive enough for a principal text for students in metallurgical engineering; he doubts whether mechanical, civil, electrical and chemical engineers can afford enough time on the matter of winning metals from ores to be able to read 568 pages about it. While undoubtedly all engineers should know much about metals, the available time is more efficiently spent in studying their properties as materials of engineering construction—that is, treating metallurgy and strength of materials as coordinate subjects—and introducing only enough smelting, working and heat treatment to show how the properties of the metals and alloys can be made to vary within useful limits.

The present book follows what may be termed the classical outline, beginning with ores, refractories and fuels, discusses sampling and ore concentration, smelting and refining. A careful reading of the 80-page chapter on copper shows it to be accurate and comprehensive, so concise that many of the implications of the text will escape the student or uninitiated. The most modern practice is discussed, giving space to obsolete and obsolescent methods only where this is necessary to illustrate some phase of present-day operations in America. The chapter ends with a detailed description of two western plants—matter somewhat out of place in a book supposed to be devoted to "principles."

Paging through the rest of the book, the other metals are found to be treated in similar satisfactory manner. The least adequate seems to be a 10-page brief on alloy steels (a section of the chapter on metallography.) Notes on the metallurgy and uses of manganese (page 404) and chromium (page 407) should be amplified and corrected in the next printing.—E. E. T.

German Treatise on Foundry Work

Die metallurgischen und metallographischen Grundlagen des Gusseisens. By K. von Kerpeley. 116 pages, 6½ x 9¾ in. 135 illustrations and 34 tables. Published by Wilhelm Knapp, Halle, (Saale), Germany.

This valuable contribution to the literature of cast iron, is Part VII of a series of books on iron, steel, and nonferrous foundry practice. It has been prepared recently with reference to new metallographic and metallurgical investigations and much of the material is based on test and microscopic examinations of defective castings. Particular attention is paid to the effect of overheating, especially in electric furnaces. There is reference to many hypotheses advanced to account for facts, which have not been definitely accounted for by tests or experience.

While the material is a trifle too technical to be used as a text book or a reference book for the average foundryman, and furthermore is written in a foreign language, that is in one sense the fault of our method of education.

The author discusses the grain of cast iron and the origin of each variety; he treats of the influences of each of the four usual alloying or adulterating elements, singly and in combination; gives a whole chapter to the influence of graphite on the grain; takes up silicon especially in reference to its influence on the graphite, and also shows what nickel, chromium and other elements do to the carbon content and character of the grain. The dependence of the mechanical properties of cast iron on the grain and treatment are also very clearly and exhaustively handled.

The diagrammatic illustrations, especially those in three dimensions, are excellent and instructive; and would be more so if the lettering of some of them were more distinct. (In this particular, American publishers have made us very exacting.)—R. G.

Industrial Economics

Industrials, Their Securities and Organization. By Sterling H. Bunnell. 334 pages. Published by A. W. Shaw Co., Chicago. Price $5.

This book is of interest to two classes of readers, those who are looking for new ideas on industrial management and those who are concerned with the market value of industrial shares. The active administrative officers of manufacturing enterprises, and the more careful investors who take time to study their problems before solving them, will be attracted by the author's presentation. Mr. Bunnell has several messages to deliver on a very broad subject, and his discussions are clear and well supplemented by numerous illustrations gathered from personal observation and experience. The work has much of the comprehensiveness of a text book, but without the usual dryness and formality.

At least four of the twelve chapters are of special interest to the investor as well as the market operator. The author reviews the development, present position and significance of the modern industrial organization. He calls attention to the wide distribution of ownership of industrial shares throughout our ever-increasing army of investors, including both capitalists and wage earners, employers and employees. He traces the important steps in the development of mechanical principles and appliances, and reviews the more recent strides in the efficiency of their application. The subjects of financing, administration, production, marketing, distribution, consumption accounting, development of personnel, plant location, working conditions, and the analysis of balance sheets and earning statements are also reviewed in considerable detail.—H. J. WOLF.

Manufacturing. Edited by Prof. Malcolm Keir. 611 pages, 6 x 9 in. Published by the Ronald Press Co., New York. Price $5.

In view of the three stages in American economics—production as a specialty, then distribution, and now the attempt to equalize these—this book has been prepared by a number of specialists to cover a report upon the principal industries of our country. Chapters follow on American labor, and Labor's industrial problems.

From the very fact that so many authors have had a finger in the literary pie, it is unsatisfactory as a proper study of the problem of manufacturing in general. There is too much historical material—or rather too little concerning the living present, and the future possibilities and

probabilities—after all, these things concern us more than what is called the dead past.

The editor commits the usual error of referring to "labor" when he means "organized labor." The latter constitutes, and always has constituted, but a very small proportion of the labor of this or any other country—in America never more than one fifth of the numbers engaged in work for pay. Another statement, that women's wages have been lower than men's for the same work primarily because the reserve supply has been greater, is not entirely true. Women receive less pay for the added reasons that as a rule they are physically less fitted, they are liable to fluctuations of physical ability, and may not be considered as permanent because they are liable to stop working for pay and take up their more proper occupation as housewives and mothers. They have also, as a rule, from their more mercurial temperament and because less apt to have dependents, a greater percentage of turnover.—R. G.

New Editions of Standard Works

Steel and Its Heat Treatment, by D. K. Bullens. Third edition, rewritten and reset. 564 pages. John Wiley & Sons, Inc., New York. Price $5.

Principles of Metallography, by R. S. Williams and V. O. Homerberg. Second edition. 260 pages. McGraw-Hill Book Co., Inc., New York. Price $3.

It is a good sign when a technical book goes into the second or third edition. Usually the author (and publisher) is glad to have the first edition bought before the book becomes a record of history. When, after a lapse of 10 or 12 years, the demand for the work is sufficient to warrant extensive revision, the subject it treats must be of live interest, and the book appraised favorably by the public.

"Bullens" certainly is well-known to heat treaters. It is the only comprehensive treatise known to the reviewer which talks heat treatment in words the heat treater understands best. Consequently many explanations of practical facts could easily be criticized by the scientist as not conforming exactly to metallurgical theory, but the truth would doubtless be less understandable to the ordinary reader if expressed more precisely.

While hardening, tempering and annealing may all be referred to critical points and heating and cooling rates, not every heat treater has a critical point apparatus. For that reason many specific examples of proper heat treatment programs to give definite properties to steels of certain analyses are undoubtedly consulted frequently by the man at the fire.

New and valuable matter has been added on the proper selection of furnaces and other equipment. It is surprising to find no mention of the McQuaid-Ehn test for normal carburizing steel in the two otherwise comprehensive chapters on case hardening.

Williams and Homerberg's book in metallography is a brief introduction to the science. Much attention is given to the chemical composition and physical constitution of useful alloys, both ferrous and non-ferrous and a table in the appendix lists the composition of many commercial alloys. Emphasis on such phases of the subject, while it undoubtedly widens the audience for the book, makes certain parts of it read more like excursions into metallurgy or engineering materials than metallography. On such excursions lapses in accuracy may be noted, probably because the authors are speaking from hearsay rather than experience.

An idea of the speed at which metallurgy is progressing may be drawn from the fact that in these late editions, the metallography book says on page 161 that "Steels containing one per cent manganese or more cannot be water quenched without danger of cracking," a statement directly contradicted by the recent extensive adoption of medium manganese steels. In Bullen's book there is no mention of nitrogen hardening, nor the ductile stainless irons or high chromium-nickel steels.

Furnace Information for Users

Practical Industrial Furnace Design, by Matthew H. Mawhinney. 318 pages. John Wiley & Sons, Inc. Price $4.

The title of this book is rather misleading, as it contains general information of practical use to engineers and managers who are contemplating the purchase of a new heating furnace, or who are studying the operation of those already installed, rather than detailed information and data to be used by furnace designers in drafting plans for new construction. Consequently the circulation of the book should be far greater than though it were restricted to furnace builders. Any user who desires to get the most for the money he spends on heat treating or baking could peruse this book with profit. It avoids the use of intricate calculations of heat production and transfer; in place of this it endeavors to give diagrams, graphs, or general relationships conveying the same information in more readily understandable manner.

One fact, emphasized at various places in the book, is that much money is often spent to save labor at the furnace, whereas a smaller outlay would save more money in fuel economy. Stated in another way, the author believes that the first place to establish economies is in fuel consumption. A small device to close a door tightly may cost less than $50 to make and install, but save that amount of money every month by keeping heat inside the furnace where it belongs. On the other hand, most equipment for handling hot metal inside a furnace is expensive to install, hard to maintain, and frequently absorbs useful heat in circulating water. Large sums must be saved in labor before it counterbalances the aggregate of these expenses.

New Books Received

Practical Steelmaking. By Walter Lister. Pages 413, 6 x 9 in., illustrated. Published by Instruments Publishing Co., 1117 Wolfendale Street, Pittsburgh.

Foundry Practice. Fourth edition. By R. H. Palmer. Pages 450, 5½ x 8¼ in., illustrated. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. Price, $3.50.

Engineering Drawing. Fourth edition. By Thomas E. French. Pages 466, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, $3.00.

Social Aspects of Industry. By S. Howard Patterson. Pages 539, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co. Price $3.00.

Human Nature and Management. By Ordway Tead. Pages 312, 5½ x 8½ in. Published by McGraw-Hill Book Co. Price, $3.50.

Industrial Economics. By Dexter S. Kimball. Pages 312, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co. Price $3.00.

Mergers in Industry. Pages 205, 6 x 9¼ in., illustrated. Published by National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, $3.00.

The American Merchant Marine Problem. Pages 167, 6 x 9¼ in., illustrated. Published by National Industrial Conference Board, Inc. Price, $2.50.

The International Financial Position of the United States. Pages 276, 6 x 9¼ in., illustrated. Published by National Industrial Conference Board, Inc. Price, $5.00.

BOOK REVIEWS

Smelting All Metals

Principles of Metallurgy, by John L. Bray. 568 pages. Ginn & Co., Boston. Price $5.80.

This solid book by the professor of metallurgy at Purdue University has apparently been written to fill the needs of the courses given at that institution. Whether it will be adopted by other colleges will depend upon the time available for such matters. In the opinion of the reviewer, Professor Bray's book is comprehensive enough for a principal text for students in metallurgical engineering; he doubts whether mechanical, civil, electrical and chemical engineers can afford enough time on the matter of winning metals from ores to be able to read 568 pages about it. While undoubtedly all engineers should know much about metals, the available time is more efficiently spent in studying their properties as materials of engineering construction—that is, treating metallurgy and strength of materials as coordinate subjects—and introducing only enough smelting, working and heat treatment to show how the properties of the metals and alloys can be made to vary within useful limits.

The present book follows what may be termed the classical outline, beginning with ores, refractories and fuels, discusses sampling and ore concentration, smelting and refining. A careful reading of the 80-page chapter on copper shows it to be accurate and comprehensive, so concise that many of the implications of the text will escape the student or uninitiated. The most modern practice is discussed, giving space to obsolete and obsolescent methods only where this is necessary to illustrate some phase of present-day operations in America. The chapter ends with a detailed description of two western plants—matter somewhat out of place in a book supposed to be devoted to "principles."

Paging through the rest of the book, the other metals are found to be treated in similar satisfactory manner. The least adequate seems to be a 10-page brief on alloy steels (a section of the chapter on metallography.) Notes on the metallurgy and uses of manganese (page 404) and chromium (page 407) should be amplified and corrected in the next printing.—E. E. T.

German Treatise on Foundry Work

Die metallurgischen und metallographischen Grundlagen des Gusseisens. By K. von Kerpeley. 116 pages, 6½ x 9¾ in. 135 illustrations and 34 tables. Published by Wilhelm Knapp, Halle, (Saale), Germany.

This valuable contribution to the literature of cast iron, is Part VII of a series of books on iron, steel, and nonferrous foundry practice. It has been prepared recently with reference to new metallographic and metallurgical investigations and much of the material is based on test and microscopic examinations of defective castings. Particular attention is paid to the effect of overheating, especially in electric furnaces. There is reference to many hypotheses advanced to account for facts, which have not been definitely accounted for by tests or experience.

While the material is a trifle too technical to be used as a text book or a reference book for the average foundryman, and furthermore is written in a foreign language, that is in one sense the fault of our method of education.

The author discusses the grain of cast iron and the origin of each variety; he treats of the influences of each of the four usual alloying or adulterating elements, singly and in combination; gives a whole chapter to the influence of graphite on the grain; takes up silicon especially in reference to its influence on the graphite, and also shows what nickel, chromium and other elements do to the carbon content and character of the grain. The dependence of the mechanical properties of cast iron on the grain and treatment are also very clearly and exhaustively handled.

The diagrammatic illustrations, especially those in three dimensions, are excellent and instructive; and would be more so if the lettering of some of them were more distinct. (In this particular, American publishers have made us very exacting.)—R. G.

Industrial Economics

Industrials, Their Securities and Organization. By Sterling H. Bunnell. 334 pages. Published by A. W. Shaw Co., Chicago. Price $5.

This book is of interest to two classes of readers, those who are looking for new ideas on industrial management and those who are concerned with the market value of industrial shares. The active administrative officers of manufacturing enterprises, and the more careful investors who take time to study their problems before solving them, will be attracted by the author's presentation. Mr. Bunnell has several messages to deliver on a very broad subject, and his discussions are clear and well supplemented by numerous illustrations gathered from personal observation and experience. The work has much of the comprehensiveness of a text book, but without the usual dryness and formality.

At least four of the twelve chapters are of special interest to the investor as well as the market operator. The author reviews the development, present position and significance of the modern industrial organization. He calls attention to the wide distribution of ownership of industrial shares throughout our ever-increasing army of investors, including both capitalists and wage earners, employers and employees. He traces the important steps in the development of mechanical principles and appliances, and reviews the more recent strides in the efficiency of their application. The subjects of financing, administration, production, marketing, distribution, consumption accounting, development of personnel, plant location, working conditions, and the analysis of balance sheets and earning statements are also reviewed in considerable detail.—H. J. Wolf.

Manufacturing. Edited by Prof. Malcolm Keir. 611 pages, 6 x 9 in. Published by the Ronald Press Co., New York. Price $5.

In view of the three stages in American economics—production as a specialty, then distribution, and now the attempt to equalize these—this book has been prepared by a number of specialists to cover a report upon the principal industries of our country. Chapters follow on American labor, and Labor's industrial problems.

From the very fact that so many authors have had a finger in the literary pie, it is unsatisfactory as a proper study of the problem of manufacturing in general. There is too much historical material—or rather too little concerning the living present, and the future possibilities and

probabilities—after all, these things concern us more than what is called the dead past.

The editor commits the usual error of referring to "labor" when he means "organized labor." The latter constitutes, and always has constituted, but a very small proportion of the labor of this or any other country—in America never more than one fifth of the numbers engaged in work for pay. Another statement, that women's wages have been lower than men's for the same work primarily because the reserve supply has been greater, is not entirely true. Women receive less pay for the added reasons that as a rule they are physically less fitted, they are liable to fluctuations of physical ability, and may not be considered as permanent because they are liable to stop working for pay and take up their more proper occupation as housewives and mothers. They have also, as a rule, from their more mercurial temperament and because less apt to have dependents, a greater percentage of turnover.—R. G.

New Editions of Standard Works

Steel and Its Heat Treatment, by D. K. Bullens. Third edition, rewritten and reset. 564 pages. John Wiley & Sons, Inc., New York. Price $5.

Principles of Metallography, by R. S. Williams and V. O. Homerberg. Second edition. 260 pages. McGraw-Hill Book Co., Inc., New York. Price $3.

It is a good sign when a technical book goes into the second or third edition. Usually the author (and publisher) is glad to have the first edition bought before the book becomes a record of history. When, after a lapse of 10 or 12 years, the demand for the work is sufficient to warrant extensive revision, the subject it treats must be of live interest, and the book appraised favorably by the public.

"Bullens" certainly is well-known to heat treaters. It is the only comprehensive treatise known to the reviewer which talks heat treatment in words the heat treater understands best. Consequently many explanations of practical facts could easily be criticized by the scientist as not conforming exactly to metallurgical theory, but the truth would doubtless be less understandable to the ordinary reader if expressed more precisely.

While hardening, tempering and annealing may all be referred to critical points and heating and cooling rates, not every heat treater has a critical point apparatus. For that reason many specific examples of proper heat treatment programs to give definite properties to steels of certain analyses are undoubtedly consulted frequently by the man at the fire.

New and valuable matter has been added on the proper selection of furnaces and other equipment. It is surprising to find no mention of the McQuaid-Ehn test for normal carburizing steel in the two otherwise comprehensive chapters on case hardening.

Williams and Homerberg's book in metallography is a brief introduction to the science. Much attention is given to the chemical composition and physical constitution of useful alloys, both ferrous and non-ferrous and a table in the appendix lists the composition of many commercial alloys. Emphasis on such phases of the subject, while it undoubtedly widens the audience for the book, makes certain parts of it read more like excursions into metallurgy or engineering materials than metallography. On such excursions lapses in accuracy may be noted, probably because the authors are speaking from hearsay rather than experience.

An idea of the speed at which metallurgy is progressing may be drawn from the fact that in these late editions, the metallography book says on page 161 that "Steels containing one per cent manganese or more cannot be water quenched without danger of cracking," a statement directly contradicted by the recent extensive adoption of medium manganese steels. In Bullen's book there is no mention of nitrogen hardening, nor the ductile stainless irons or high chromium-nickel steels.

Furnace Information for Users

Practical Industrial Furnace Design, by Matthew H. Mawhinney. 318 pages. John Wiley & Sons, Inc. Price $4.

The title of this book is rather misleading, as it contains general information of practical use to engineers and managers who are contemplating the purchase of a new heating furnace, or who are studying the operation of those already installed, rather than detailed information and data to be used by furnace designers in drafting plans for new construction. Consequently the circulation of the book should be far greater than though it were restricted to furnace builders. Any user who desires to get the most for the money he spends on heat treating or baking could peruse this book with profit. It avoids the use of intricate calculations of heat production and transfer; in place of this it endeavors to give diagrams, graphs, or general relationships conveying the same information in more readily understandable manner.

One fact, emphasized at various places in the book, is that much money is often spent to save labor at the furnace, whereas a smaller outlay would save more money in fuel economy. Stated in another way, the author believes that the first place to establish economies is in fuel consumption. A small device to close a door tightly may cost less than $50 to make and install, but save that amount of money every month by keeping heat inside the furnace where it belongs. On the other hand, most equipment for handling hot metal inside a furnace is expensive to install, hard to maintain, and frequently absorbs useful heat in circulating water. Large sums must be saved in labor before it counterbalances the aggregate of these expenses.

New Books Received

Practical Steelmaking. By Walter Lister. Pages 413, 6 x 9 in., illustrated. Published by Instruments Publishing Co., 1117 Wolfendale Street, Pittsburgh.

Foundry Practice. Fourth edition. By R. H. Palmer. Pages 450, 5½ x 8¼ in., illustrated. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. Price, $3.50.

Engineering Drawing. Fourth edition. By Thomas E. French. Pages 466, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co., 370 Seventh Avenue, New York. Price, $3.00.

Social Aspects of Industry. By S. Howard Patterson. Pages 539, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co. Price $3.00.

Human Nature and Management. By Ordway Tead. Pages 312, 5½ x 8½ in. Published by McGraw-Hill Book Co. Price, $3.50.

Industrial Economics. By Dexter S. Kimball. Pages 312, 6 x 9¼ in., illustrated. Published by McGraw-Hill Book Co. Price $3.00.

Mergers in Industry. Pages 205, 6 x 9¼ in., illustrated. Published by National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price, $3.00.

The American Merchant Marine Problem. Pages 167, 6 x 9¼ in., illustrated. Published by National Industrial Conference Board, Inc. Price, $2.50.

The International Financial Position of the United States. Pages 276, 6 x 9¼ in., illustrated. Published by National Industrial Conference Board, Inc. Price, $5.00.

Fabricated Structural Steel

More Than One-Half of Lettings, Totaling 34,000 Tons, Was for Work in New York

MORE than one-half of the structural steel lettings in the past week, totaling 34,000 tons, was for work in the New York metropolitan area. Included in the New York projects were 6000 tons for an apartment building, 3800 tons for a power house addition and 2550 tons for pier 3 in the North River. Inquiries amounting to 35,000 tons were slightly less than those of the previous week and included 10,000 tons of plates for a pipe line at Everett, Wash., 2500 tons for garages at Chicago and 2500 tons for airports at various locations for the Curtiss Airport Corporation. Awards follow:

BOSTON, 400 tons, Boston Insurance Co. building, to New England Structural Co.

SLATERSVILLE, MASS., 200 tons, power house, to H. B. Smith Co.

DEER LAKE, NEWFOUNDLAND, 135 tons, addition to power house of International Paper Co., to Jones & Laughlin Steel Corporation.

BOSTON & ALBANY RAILROAD, 600 tons, roundhouse at Beacon Park, Mass., to McClintic-Marshall Co.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD, 100 tons, bridge at Canton, Mass., to Boston Bridge Works, Inc.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD, 196 tons, bridge at Port Chester, N. Y., to unnamed bidder.

NEW YORK CENTRAL RAILROAD, 2500 tons, car shops at Harmon, N. Y., to American Bridge Co.

NEW YORK, 2550 tons, Pier 3, North River, to American Bridge Co.

NEW YORK, 3800 tons, addition to Hell Gate power house, to American Bridge Co.

NEW YORK, 200 tons, St. Margaret's School, to McClintic-Marshall Co.

NEW YORK, 1600 tons, apartment building at 1222 Park Avenue, to Paterson Bridge Co.

NEW YORK, 6000 tons, London Terrace apartments on Twenty-Third Street, to Levering & Garrigues Co.

NEW YORK, 1400 tons, apartment building at 104th Street and Central Park West, to Easton Structural Steel Co.

NEW YORK, 815 tons, public schools Nos. 71, 154 and 135, to Easton Structural Steel Co.

NEW YORK, 214 tons, apartment building at 21 East Seventy-Fourth Street, to Easton Structural Steel Co.

NEW YORK, 133 tons, Broadway Exchange Building at 61 Broadway, to Post & McCord, Inc.

JERSEY CITY, N. J., 350 tons, church and rectory, to Mullaney Iron Works.

LOCUST SUMMIT, PA., 260 tons, cleaning plant for Reading Coal Co., to Shoemaker Bridge Co.

OAKMONT, PA., 200 tons, Edgewater Steel Co., to Guibert Steel Co.

PITTSBURGH, 200 tons, Duquesne Slag Products Co., to Pittsburgh Bridge & Iron Works.

STATE OF TENNESSEE, 300 tons, highway bridges, to Virginia Bridge & Iron Co.

IRMO, S. C., 750 tons, hydroelectric power station for Lexington Water Power Co., awarded by W. S. Barstow Co., Reading, Pa., to Belmont Iron Works.

PITTSBURGH, 3000 tons, 20 barges for Basic Barge Line, Inc., to Dravo Contracting Co.

MOUNT VERNON, OHIO, 180 tons, Pittsburgh Plate Glass Co., to Pittsburgh Bridge & Iron Works.

HAMMOND, IND., 800 tons, factory for Lever Brothers Co., to Duffin Iron Co., Chicago.

ROGERS CITY, MICH., 1000 tons, Michigan Lime Stone & Chemical Co., to American Bridge Co.

NORTHERN PACIFIC, 350 tons, viaduct at Superior, Wis., to an unnamed bidder.

CHICAGO, 1000 tons, Edison Electric Appliance Co., to McClintic-Marshall Co.

CHICAGO, 1000 tons, pipe and plate work for Wisconsin Steel Co., to John Mohr & Sons, local.

KANSAS CITY, MO., 700 tons, Hall Building, to Kansas City Structural Steel Co.

SAN JOSE, CAL., 100 tons, factory, to Dyer Brothers.

SEATTLE, 3700 tons plates, Cedar River pipe line, to Western Pipe & Steel Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

GOULDS MILL, VT., 200 tons, bridge for Springfield Terminal Railway.

CENTRAL VERMONT RAILROAD, 200 tons, bridge at White River Junction, Vt.

BEVERLY, MASS., 200 tons, bridge.

NASHUA, N. H., 100 tons, office building.

NEW YORK CENTRAL RAILROAD, 300 tons, grade crossing elimination at Forks, N. Y.

NEW YORK, 13,200 tons, section 5, route 108 of subway in Queens, general contract to George H. Flynn, Inc.

NEW YORK, 1675 tons, Lenox Hill hospital.

NEW YORK, 2500 tons, airports at various locations for Curtiss Airport Corporation.

ELIZABETH, N. J., 1725 tons, highway bridge for State Highway Commission.

PENNSYLVANIA RAILROAD, 800 tons, five bridges.

PHILADELPHIA, 650 tons, Germantown Trust Co. building.

PENNSYLVANIA RAILROAD, 14,500 tons, bridges over Hackensack River: for passengers, 10,000 tons; for freight, 4500 tons; Phoenix Bridge Co., low bidder.

STATE OF PENNSYLVANIA, 780 tons, bridge at Connaught Creek, Erie County, 160 tons; viaduct in Northumberland County, 620 tons.

STATE OF NEW JERSEY, 2000 tons, two bridges on route 25; bids open Aug. 12.

ATLANTIC COUNTY, N. J., 500 tons, Dorset Boulevard bascule bridge; bids open Aug. 14.

PHILADELPHIA, 800 tons, bridge for city at Henry Avenue over Reading Railroad.

BUFFALO, 860 tons, State office building; McClintic-Marshall Co. low bidder.

CLEVELAND, 300 tons, Kinsman Road grade elimination bridge for Cleveland Union Terminals Co.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC, 2000 tons, car shops at Milwaukee.

MADISON, WIS., 1400 tons: 800 tons for field house and 600 tons for mechanical engineering building.

CHICAGO, 250 tons, Gateway Theater.

CHICAGO, tonnage not stated, 35-story building for Otis Estate, Holabird & Roche, architects.

CHICAGO, 2500 tons, chain of garages.

EAST ST. LOUIS, ILL., 700 tons, mill building for Laclede Steel Co.

BREMERTON, WASH., 200 tons, plates, 10 to 24-in. riveted or cast iron pipe; bids Aug. 7.

EVERETT, WASH., 10,000 tons, plates, pipe line, 44 to 56-in.; bids to be called next week.

TACOMA, WASH., 2000 tons, plates, penstock and surge tank; bids Aug. 8.

TACOMA, 2400 tons, Eleventh Street viaduct over Milwaukee tracks; bids soon.

SAN FRANCISCO, 300 tons, Sommer-Kaufman store; bids being taken.

Reinforcing Steel

Lettings Total Only 2400 Tons and Inquiries Lag

DULLNESS in reinforcing steel is indicated by the fact that awards in the past week totaled only 2400 tons. Fresh inquiries amounted to about 3600 tons, the largest being 1000 tons for a filtration plant at Peoria, Ill. Awards follow:

NEW YORK, 400 tons, sewer work in Bronx, to Kalman Steel Co.

CLEVELAND, 250 tons, factory addition for Richman Brothers Co., to Bourne-Fuller Co.

CHICAGO, 425 tons, warehouse at Orleans and Huron Streets, to Concrete Steel Co.

CHICAGO, 220 tons, building for Cushman Sons, to Concrete Engineering Co.

HAWTHORNE, NEV., 600 tons bars and 400 tons wire mesh, ammunition depot, to Truscon Steel Co.

RENO, NEV., 130 tons, Mackay Science Hall, University of Nevada, to Truscon Steel Co.

BEVERLY HILLS, CAL., 205 tons, bank, Santa Monica Boulevard, to Soule Steel Co.

MONTEREY, CAL., 119 tons, garage, to unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 700 tons, office building.

CINCINNATI, 300 tons, bridge piers and Union Station approach, for Cincinnati Union Depot Co.

CINCINNATI, 200 tons, new Christ Hospital.

CINCINNATI, 100 to 200 tons, Hamilton County Tuberculosis Hospital.

ARLINGTON HEIGHTS, ILL., 500 tons, filtration plant.

CHICAGO, 250 tons, garage on Clark Street, Fox & Fox, architects.

CHICAGO, 400 tons, commercial building for Zimmerman, Saxe & Zimmerman Co.

PEORIA, ILL., 1000 tons, filtration plant.

ST. LOUIS, 500 tons, McMillan Hospital for Washington University medical group.

The American Rolling Mill Co. will construct a four-hole regenerative soaking pit at its Columbia plant, Butler, Pa. The contract, including stack and additional producer gas flues, has been let to the Rust Engineering Co., Pittsburgh. The National Tube Co., Pittsburgh, will build five continuous Rust recuperative tube reheating furnaces at its Lorain, Ohio, and McKeesport, Pa., works. The furnaces will have a heating capacity in excess of 250 tons of tubes an hour.

Machinery Markets and News of the Works

Tool Buying Well Sustained

August Sales Expected to Be Better Than Normal—General Electric Co. Is Large Purchaser

USUALLY a light month for machine tool sales, August has opened with buying sustained at a fairly high level, although a slight decline in demand is reported from some manufacturing centers.

A slackening in the volume of orders in the Chicago and New England districts has been offset by gains at Cincinnati and by continued liberal bookings at New York and Cleveland.

Machine tool builders are of the opinion that business during August will be better than normal for a midsummer month, although a let-down from the July volume is not unexpected. Shop operations are being carried along at capacity and in most cases unfilled orders are sufficiently large to insure the maintenance of present production schedules well into the fall.

Final reports of July sales reveal that they were only a little if any less than those of June. A Cleveland turret lathe builder states that bookings last month showed an increase of 20 per cent over those of the previous month and were on a parity with those of May, which was a peak month.

General Electric Co. has been a heavy buyer, having purchased tools for its Lynn and Pittsfield plants and for its electric refrigerator manufacturing department. American Locomotive Co. is inquiring for 10 large tools for its Dunkirk, N. Y., plant and the International Harvester Co. probably will begin closing for special machines on its list the coming week.

The Cleveland Union Terminal Co. has contracted for several machines included in its list of 25 tools for which inquiries were made a few weeks ago. The Amtorg Trading Corporation has purchased some tools, including gear-cutting machines, for a tractor plant in Russia and an American builder has sold eight electric drop hammers for Russian delivery.

New York

NEW YORK, Aug. 6.—Machine tool buying continues active with business well distributed. Outstanding among the large buyers is the General Electric Co., Schenectady, which has closed on two milling machines for its turbine department, several tools for its Lynn and Pittsfield, Mass., plants and additional equipment for its refrigerator manufacturing department, including eight presses, a press brake, shaper, cutter grinder, radial drill and engine lathes. Tools are still pending for this division of the company, which is reported producing about 3500 refrigerators a month, while recent sales have been at the rate of about 5500 a month. Westinghouse Electric & Mfg. Co. is also an active buyer for its refrigerator manufacturing plant.

Western Electric Co. still has a number of inquiries out for tools for its Kearny, N. J., plant and American Locomotive Co. is inquiring for more than 10 machines for its Dunkirk plant. Wood Newspaper Machine Corporation, Plainfield, N. J., has closed on several tools, and International Motor Co., Plainfield, has been a small buyer the past week. Among aircraft manufacturers, Sikorsky Aviation Corporation, College Point, N. Y., and Bridgeport, Conn., has closed on three precision bench lathes and Fairchild Aviation Corporation, Farmingdale, N. Y., and Fokker Aircraft Corporation of America, Hasbrouck Heights, N. J., have also been recent buyers.

Plans are being completed by Curtiss Airports Corporation, 27-29 West Fifty-seventh Street, New York, for new airport on 325-acre tract recently acquired at Valley Stream, L. I., replacing former airport at Mineola, L. I., to consist of six hangars, motor repair and equipment shops, airplane repair base, oil storage buildings and other units, to cost over $350,000 with equipment. Complete flying school will be established. Kenneth Franzheim, 345 Madison Avenue, New York, is architect.

United American Metals Corporation, foot of Clay Street, Brooklyn, has plans for a new one and two-story plant, to cost $45,000 with equipment. Gustave Erda, 788 Manhattan Avenue, is architect.

Motor Replacement Parts Corporation, 29 Grove Avenue, Port Richmond, S. I., has leased new building, 30 x 75 ft., now in course of erection on New Street, and will occupy as new mechanical shop. G. C. Marino and Elbert Stewart, Jr., are heads.

Rockland Light & Power Co., Nyack, N. Y., has work under way on a new hydroelectric power plant, to cost over $200,000 including transmission lines, to connect with present system.

Margon & Holder, 29 West Fifty-seventh Street, New York, architects, have filed plans for two-story automobile service, repair and garage building on White Plains Road, to cost about $160,000 with equipment.

Westinghouse Electric & Mfg. Co., 150 Broadway, New York, with main plant at East Pittsburgh, has purchased 22-acre tract in meadow district, Newark, N. J., as site for new Eastern plant. Initial structures will be used primarily for storage and distributing service and are reported to cost more than $500,000. Later it is proposed to erect group of multi-story manufacturing units to cost over $5,000,000 with equipment. It is said that a number of smaller plants will be removed to new location, including factories now at New York and Brooklyn, South Bend, Ind., and Springfield, Ohio.

Royal Show Case Co., 648 Wythe Avenue, Brooklyn, has revised plans for new plant unit, to cost about $50,000 with equipment, for which bids will be asked on general contract early in fall. Murray Klein, 65 Court Street, is architect.

Knickerbocker Ice Co., 41 East Forty-second Street, New York, will soon take bids on general contract for a four-story ice-manufacturing plant, to cost about $100,000 with machinery. C. Leslie Wier is company architect and engineer.

Ford Motor Co., Detroit, has taken title to 35-acre tract at Edgewater, N. J., for new assembling and distributing plant, with power house, to cost over $5,000,000 with equipment. New works will be used primarily for export account and will replace present plant at Kearny, N. J., recently sold to Western Electric Co. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer for Ford plant and bids will be asked on general contract from that office about middle of month.

Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, will erect new storage and distributing plant at Atlantic Highlands, N. J., to cost about $225,000 with equipment.

North Jersey District Water Supply Commission, 24 Commerce Street, Newark, will receive bids until Aug. 20 for motor-generator exciter sets, oil circuit breakers, switchgear and other equipment for electric station at headworks at Wanaque dam, Wanaque, to cost about $100,000; also for electrically-operated centrifugal pumping units of 23 million and 11 million gal. per day capacity, and smaller pumping machinery, with accessories, to cost about $50,000. Morris R. Sherrerd is consulting engineer.

Turner Tanning Machinery Co., 51-53 Commercial Street, Newark, manufacturer of machinery and parts for leather tanneries, has leased building at 27 Haynes Street, totaling about 10,000 sq. ft. floor space, for expansion and will remove to new location. Headquarters are at Peabody, Mass. John Fitzgerald is general manager.

Crew Levick Co., 219 North Broad Street, Philadelphia, refined oils, gasoline, etc., subsidiary of Cities Service Co., 60 Wall Street, New York, has plans for storage and distributing plant at Perth Amboy, N. J., to cost more than $100,000 with equipment.

Groov-Pin Corporation, formerly located 45-22 Thirty-eighth Street, Long Island City, has moved to a larger plant at 47-18 Thirty-seventh Street.

Dur-O-Bilt Metal Corporation, 402-404 West Twenty-fifth Street, New York, has been organized with capital of $20,000 to manufacture metal equipment for restaurants, cafeterias and kitchens.

Hobson, Houghton & Co., Ltd., Sheffield, England, steel manufacturer, has organized Hobson, Houghton & Co., Inc., and has established an agency at 790-794 Greenwich Street, New York, where all transactions in United States will be taken care of. Arthur R. Purdy is president of new company, and Rowland Bramall, secretary-treasurer and manager.

South Atlantic

BALTIMORE, Aug. 5.—Contract has been let by Williamsport Wire Rope Co., Williamsport, Pa., to Jacob Gehron Co., Inc., same city, for one-story branch plant, 100 x 180 ft., in Sparrows Point section, Baltimore, to cost more than $90,000 with equipment. Works will replace temporary plant at same place leased from Bethlehem Steel Co. Facilities will be provided for doubling capacity. G. R. Shepherd is plant manager.

Celanese Corporation of America, Inc., Amcelle, near Cumberland, Md., has plans for three-story solvents recovery unit, to cost $150,000 with machinery. F. T. Small is company engineer.

Republic Service Corporation, 424 Land Title Building, Philadelphia, W. C. Devin, engineer, is concluding purchase of municipal electric light and power plant and system at Radford, Va., for a price of $400,500, and plans extensions, including transmission lines.

Chesapeake & Ohio Railroad Co., Richmond, Va., has awarded general contract to John W. Cowper Co., State Planters' Bank Building, city, for extensions and improvements in engine house and shops at Hinton, W. Va., including coaling station facilities, coal conveying equipment, engine supply building and electric shop, etc., to cost $265,000. Company is also planning expansion in engine house and terminal shops at Elk, W. Va., to cost about $50,000 with equipment. C. W. Johns is chief engineer.

Board of Trustees, University of Maryland, Baltimore, is said to be planning call for bids for three-story addition to engineering building to cost about $100,000 with equipment. Smith & May, Calvert Building, are architects.

R. J. Reynolds Tobacco Co., Winston-Salem, N. C., has plans for a one-story addition to tin foil manufacturing plant, to cost about $40,000 with equipment.

Charlotte Electric Supply Co., Charlotte, N. C., manufacturer of electrical specialties, has plans for new one-story plant, to cost about $24,000 with equipment.

McCleskey Cotton Oil & Peanut Mills, Inc., Americus, Ga., recently organized by L. L. McCleskey, Americus, and associates, has purchased local mill of Farmers' Oil Co., for new plant. Extensions and improvements are planned.

City Council, Atlanta, Ga., has authorized construction of new hangar with shop facilities at Candler Field, to cost about $50,000 with equipment.

Charlottesville Oil Corporation, Charlottesville, Va., has plans for a new oil storage and distributing plant for motor oils, including elevated steel tanks, pumping equipment, etc., to cost about $45,000.

Washington County School Board, Hagerstown, Md., B. J. Grimes, superintendent, is said to be planning installation of manual training department in new two-story high school at Clear Spring, Md., to cost $115,000, for which plans are being drawn by A. J. Klinkhart, Kohler Building, Hagerstown, architect.

Consumers Utility Co., Staunton, Va., has secured gas franchise at Harrisonburg, Va., and is said to be planning new artificial gas plant, to cost about $100,000 with equipment and pipe lines.

Hardwood Dimension Co., Florence, S. C., has awarded general contract to W. A. Cravy & Sons, 1226 Sumter Street, Columbia, S. C., for one-story plant, 120 x 500 ft., to cost about $90,000 of which about one-half will be used for machinery. Majority of equipment will be electrically operated.

The Crane Market

NEW business in overhead and locomotive cranes is small, but a substantial number of inquiries is in the market, including six overhead cranes for the Board of Transportation, New York, for installation in sub-stations. In the Chicago district, the Rockford Iron Works, Rockford, Ill., is in the market for a 5-ton, 20-ft. span electric traveling crane.

Among recent purchases are:

Walworth Co., Kewanee, Ill., 5-ton, 34-ft. span overhead crane from Shepard Niles Crane & Hoist Corporation.

Auto Specialities Co., St. Joseph, Mich., two 5-ton, overhead cranes from Western builder.

Union Steam Pump Co., Battle Creek, Mich., 40-ton, 60-ft. span overhead crane from unnamed builder.

Philadelphia

PHILADELPHIA, Aug. 5.—Bids have been asked on general contract by Reading Co., Reading Terminal, Philadelphia, for one-story electric car repair and construction shop, 137 x 325 ft., with lean-to extension, 25 x 119 ft., at Nineteenth Street and Wagner Avenue, Wayne Junction, to cost more than $100,000 with equipment. Clark Dillenback is company architect.

Riter Brothers & Co., Inc., 1022 Race Street, Philadelphia, metals, has leased former two-story storage and distributing plant of General Electric Co., at Frankford Avenue and Palmer Street, for expansion.

Curtis-Martin Newspapers, Inc., Independence Square, Philadelphia, has awarded general contract to Doyle & Co., 1519 Sansom Street, for two-story addition to automobile service, repair and garage building for company trucks and cars, to cost $150,000 with equipment.

Department of Public Works, City Hall, Philadelphia, is arranging bond issue of $1,000,000 for new municipal airport at South Philadelphia, including hangars, repair and reconditioning shops, oil storage building and other units. Project will require about $7,000,000 for completion, and an additional fund of $6,000,000 will be secured later. Alexander Murdoch is director of department.

Elevating, conveying and other mechanical-handling equipment will be installed in new storage and distributing plant to be erected by Frankford Grocery Co., Penn Avenue and Unity Street, Philadelphia, to cost $175,000. W. E. S. Dyer, Land Title Building, is architect and engineer.

General Cold Storage Co., 328 Market Street, Camden, N. J., recently organized with capital of $1,000,000 by J. P. Murray, 4813 Springfield Avenue, Philadelphia, and associates, is said to be planning establishment of ice-manufacturing and cold storage plant, to cost more than $350,000 with machinery. Harry C. Polk, Glenside, Pa., is interested in new company.

Berks Airways, Inc., Reading, Pa., care of E. Hickman, 148 South Fifth Street, architect, has plans for airport near Jacksonwald, including hangars, repair shops and other units, to cost over $300,000 with equipment.

Officials of Capital City Iron & Steel Co., Harrisburg, Pa., affiliated with Harrisburg Pipe & Pipe Bending Works, Inc., have organized Harrisburg Steel Co., to take over and expand present organization. Connection with Harrisburg Pipe & Pipe Bending Works, Inc., will continue as heretofore. New company will be represented by R. Frank Shaffner, Jr.

Thomas B. Lippincott, 11 South Sixteenth Street, Philadelphia, architect, has plans for a three-story automobile service, repair and garage building, to cost about $100,000 with equipment.

Lycoming Mfg. Co., Williamsport, Pa., manufacturer of automobile engines, a subsidiary of Auburn Automobile Co., Auburn, Ind., is completing an addition for production of airplane motors and expects to have unit ready for service early in fall.

Detroit

DETROIT, Aug. 5.—Wolverine Carburetor Co., Jackson, Mich., recently organized by T. G. Atkins, Jackson, and associates, has taken over former local factory of C. J. Mfg. Co., for manufacture of carburetors and kindred equipment.

Standard Tube & Mfg. Co., 2435 Scotten Avenue, Detroit, manufacturer of metal tubular products, is reported planning new factory at Ferndale, Mich., to cost more than $60,000 with equipment.

Michigan Brass & Iron Works, Lansing, Mich., is planning to rebuild part of foundry destroyed by fire July 28.

American Wire Cloth Co., 1432 North Pitcher Street, Kalamazoo, Mich., manufacturer of wire, screens, etc., will erect one-story plant, 40 x 120 ft. in Parchment district, to cost about $35,000 with equipment. Present works will be removed to new location and capacity increased. American Signs Corporation, manufacturer of signs, displays and kindred specialties, will occupy factory to be vacated by American Wire company for expansion; present sign manufacturing plant will be continued as heretofore.

Chevrolet Motor Co., Flint, Mich., has begun construction of one-story unit, 250 x 375 ft., for metal stamping plant, to cost about $500,000 with equipment.

Michigan Steel Tube Products Co., Hamtramck, Mich., has approved an expansion program to cost $300,000, including new units to develop capacity of about 5,000,000 ft. of electrically welded steel tubing per month, covering primarily tubular products for automobiles.

Baker-Perkins Co., Williamson Street, Saginaw, Mich., manufacturer of special machinery and parts for chemical, food products and other industries, has awarded general contract to Trier Construction Co., 2113 Court Street, for one-story addition, to cost about $55,000 with equipment. Carl Pletscher is president.

Packard Motor Car Co., East Grand Boulevard, Detroit, has plans for a four-story addition, to cost more than $200,000 with equipment. Albert Kahn, Inc., Marquette Building, is architect and engineer. Packard company is completing erection of unit for production of Diesel engines and parts for airplanes to be ready for service by end of month. It will represent an investment of about $500,000.

Stark Pump Co., 17128 Mount Elliott Avenue, Detroit, has been incorporated and will continue manufacture of automatic electric basement drainers, fountain, brine and booster pumps.

New England

BOSTON, Aug. 5.—Bookings by machine tool dealers have declined. Manufacturers, however, have received some good orders from outside points, but report a falling off in demand. A Hartford maker of electric drop hammers has done a substantial business for both foreign and domestic account. It has sold eight hammers, costing about $7,500 each, to the Soviet Government, and is negotiating for additional business. The Spicer Mfg. Co., Toledo, has bought three hammers. It is the general opinion that business will remain comparatively quiet until after the National Machine Tool exhibition next month.

Business in small tools continues in large volume. July sales were the best for any month this year.

Bay State Abrasive Products Co., Westboro, Mass., is taking bids on a one-story plant, 80 x 100 ft.

City of Westfield, Mass., will have plans ready next month for a two-story and basement trade school addition which will require metal working equipment.

Pratt & Whitney Aircraft Co., Hartford, Conn., a unit of United Aircraft Transportation Co., New York, has awarded a contract to Levering & Garrigues, New York, for new plant at East Hartford to manufacture Wasp aircraft engines and parts. Main unit will be one-story, 400 x 1000 ft., with two-story engineering building, entire project to cost about $2,000,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer. Chance Vought Aircraft Corporation, Long Island City, N. Y., another affiliation of parent company, has plans by same architect for new plant near site of Wasp engine works, with one-story main unit, 320 x 672 ft., and several smaller buildings, for production of passenger and commercial aircraft. Project will include an airport with hangars, mechanical shops, etc., and is reported to cost more than $1,500,000 with machinery. Bids will be asked at once on general contract. Boeing Aircraft & Transportation Co., Seattle, another unit of United Aircraft organization, has plans for an Eastern plant at same location in East Hartford, for production of transcontinental airplanes and parts, to cost over $1,000,000 with equipment. It is understood that same architect will prepare plans for this plant.

Board of Education, Central Falls, R. I., is remodeling former city hall for trade school, and will install machine and automobile repair shop, woodworking shop and other departments. It is planned to have school ready for occupancy in fall. Holbert T. Smales is director of vocational education.

Fletcher-Thompson, Inc., 542 Fairfield Avenue, Bridgeport, Conn., architect and engineer, has plans for a two-story automobile service, repair and garage building, 100 x 300 ft., to cost about $185,000 with equipment.

Nash Engineering Co., Wilson Avenue, Norwalk, Conn., manufacturer of air compressors, etc., has filed plans for one-story addition, 30 x 180 ft., to cost about $38,000 with equipment.

Worcester Pressed Steel Co., Barber Avenue, Worcester, Mass., has awarded general contract to Harty & Brown, 25 Hunt Avenue, Boston, for one-story addition, to cost about $40,000 with equipment.

Texas Corporation, 31 St. James Avenue, Boston, has awarded general contract to Simpson Brothers Corporation, 77 Summer Street, for one-story repair shop at oil storage and distributing plant, 100 x 135 ft., to cost about $45,000 with equipment.

Continental Airports, Inc., New Haven, Conn., has acquired 110-acre tract at Milford, Conn., for new airport and has plans for hangars, repair shop, oil storage and other units, entire project to cost more than $175,000 with equipment. Port will be known as Hiram Bingham Field.

Buffalo

BUFFALO, Aug. 5.—Consolidated Aircraft Co., 2050 Elmwood Avenue, Buffalo, has acquired property near Fort Erie, Ont., as site for new plant including parts manufacture and assembling departments, and is said to have plans under way for initial units to cost more than $250,000 with equipment. R. P. Whitman is general manager.

Marcellus Casket Co., Van Rensselaer Street, Syracuse, N. Y., will take bids at once for four-story addition, to cost about $90,000 with equipment. M. L. King, Dennison Building, is architect.

Associated Gas & Electric Co., operating light and power utilities in northern New York, Pennsylvania and New England, is arranging for expansion in different properties, with steel tower transmission lines. A fund of $40,000,000 is being scheduled for work. Executive offices are at 61 Broadway, New York.

William B. Lausterer, 535 Lake View Avenue, Jamestown, N. Y., and associates have organized American Hydraulic Appliance Corporation with capital of $30,000, and plan establishment of new plant at Buffalo for production of hydraulic and other mechanical equipment.

Dahlstrom Metallic Door Co., Buffalo and Second Streets, Jamestown, manufacturer of fireproof doors, sash, etc., has plans for an addition, to cost about $40,000 with equipment. Oliver Johnson, Fenton Building, is architect.

Department of Public Works, City Hall, Rochester, N. Y., Harold W. Baker, commissioner, has plans for hangar with shop and repair facilities at municipal airport, to cost about $35,000 with equipment.

Syracuse Gauge Mfg. Co., Syracuse, N. Y., care of Frank O. Scherr, 102 Stroud Place, recently organized by Mr. Scherr and associates, is said to be planning operation of local factory for manufacture of gages, valves and kindred specialties. Henry Scherr, 1406 Butternut Street, is also interested in organization.

Falk Mill Supply Co., 477 St. Paul Street, Rochester, N. Y., machinery dealer, has purchased plant and equipment of Climax Locomotive Works, builder of locomotives used in lumber camps, mines, mills, etc. This purchase marks opening of new branch of business for Falk company.

Cincinnati

CINCINNATI, Aug. 5.—New business booked by machine tool manufacturers in this territory the last few days in July brought the month's total to a higher level than that of July, 1928, and about on a parity with June of this year. General activity has sustained operations at an unusually high level for this season of the year and the number of unfilled orders is still large. Manufacturers report sufficient bookings to continue capacity production well into the fall. A constant flow of small inquiries also augurs well for a continued steady demand.

Kansas City Southern Railroad has placed an order with a local manufacturer for two large engine lathes.

Contract has been let by Master Electric Co., Dayton, Ohio, manufacturer of electrical equipment, to Huffman Realty Co., Dayton, for one-story addition, to cost $30,000 with equipment.

Board of Education, Portsmouth, Ohio, plans installation of manual training equipment in new two-story and basement junior high school to cost $230,000, for which bids are being asked on general contract. R. Wile, Portsmouth, is architect; William B. Ittner, 911 Locust Street, St. Louis, is consulting architect and engineer.

Harnischfeger Sales Corporation, 267 Union Avenue, Memphis, Tenn., an interest of Harnischfeger Corporation, Milwaukee, has awarded general contract to Memphis Construction Co., 160 Union Avenue, for one-story factory branch, storage and distributing plant, with service division, 40 x 175 ft., to cost about $50,000 with equipment. Hanker & Cairns, 123 South Court Street, Memphis, are architects.

Stumb Motor Co., 1408 Broad Street, Nashville, Tenn., has plans for three-story service, repair and garage building, 102 x 170 ft., to cost about $100,000 with equipment. Warfield & Keeble, Nashville Trust Building, are architects.

Mead Pulp & Paper Co., Chillicothe, Ohio, has plans for an addition for pulp and paperboard manufacture, to cost about $400,000 with machinery. Company engineering department is in charge.

Nashville Warehouse & Elevator Co., Nashville, Tenn., is planning to rebuild part of grain elevator and plant destroyed by fire July 27, with loss reported close to $400,000, including elevating, conveying and other equipment.

City Council, Chattanooga, Tenn., has awarded general contract to Rogers & Leventhal, 826 East Eleventh Street, for

hangar, repair shop and terminal buildings at municipal airport, to cost about $55,000 with equipment. William Crutchfield, First National Bank Building, and Maxwell James, Provident Life Building, are architects.

Milwaukee

MILWAUKEE, Aug. 5.—Production in all metal working plants continues at the high rate of preceding months and no signs of a summer lull are as yet discernible. Demand from the smaller shops is especially strong. Agricultural implement makers look for a better fall business than that of early summer or spring. Automobile manufacturers, while curtailing current production, are the source of an unusual amount of inquiries. Deliveries show no improvement.

Milwaukee County Park Commission is taking bids for a hangar, 80 x 100 ft., for experimental department of Hamilton Metalplane Co. at Milwaukee County Airport. Charles F. Barndt, 530 Park Street, is general manager of Hamilton company.

Little Wolf Co., New London, Wis., will build dam and hydro electric power plant on Little Wolf River three miles from New London. Dr. W. H. Finney, Clintonville, Wis., is president of company and Frank L. Zaug, New London, secretary.

Janesville Foundry & Machine Co., Janesville, Wis., recently organized by A. W. Schlueter, owner of Schlueter Boiler Works, and Walter Reynolds, Beloit, Wis., has taken over idle foundry of New Doty Mfg. Co., 301 North Main Street and will specialize in gray iron castings.

Marathon Rubber Products Co., Inc., Wausau, Wis., will take bids soon on a one-story addition, 86 x 121 ft.

Sliding Clutch Mfg. Co., 1830 Vliet Street, Milwaukee, has been incorporated to manufacture a sliding clutch, either in its own plant or on a contract basis. Jacob Weisling is president and treasurer.

Moe Brothers Mfg. Co., 113-121 East Clybourn Street, Milwaukee, has been organized to manufacture lighting equipment and kindred products and is now in production.

Pittsburgh

PITTSBURGH, Aug. 5.—Machinery business in this district during July was about equal to June and considerably ahead of July last year. August indicates little decline from the July figure, as local offices are busy preparing estimates on new inquiries, and the Westinghouse Electric & Mfg. Co. and the United States Aluminum Co. are expected to close on a good portion of their extensive lists this month.

Machine tool deliveries are quite extended and many dealers have been unable to quote on considerable business in which they normally would have been interested. For this reason quotations are very firm and manufacturers' representatives are satisfied with the margin of profit now being obtained.

Tidewater Pipe Co., Ltd., Franklin, Pa., a subsidiary of Tidewater Oil Co., 11 Broadway, New York, has purchased plant and property of Emery Mfg. Co., consisting of oil refinery at Franklin, pipe lines, oil storage and distributing plants, and other units. New owner plans expansion. George J. Hanks is president.

Wightman Glass Bottle Co., Parker, Pa., will double former output of plant recently destroyed by fire, and has plans for main one-story unit, 125 x 270 ft. New bottle-making machinery will be installed, all equipment to be electrically operated. It will cost more than $350,000 with equipment. Knox Glass Co., is interested in project.

Presto Electric Roaster Co., Pittsburgh, recently formed with capital of $100,000, is said to be arranging establishment of plant for production of electric heating appliances and kindred equipment. Company is represented by Ivan Bielek, 440 Tenth Avenue, Munhall, Pa., treasurer. S. M. Bielek, 1001 Butler Pike, Etna, Pa., is also interested in new organization.

Board of Education, Borough of Overbrook, Pa., is said to be planning installation of manual training equipment in two-story addition to junior high school, to cost over $175,000. Louis Stevens, Century Building, Pittsburgh, is architect.

Hazel-Atlas Glass Co., Wheeling, W. Va., will make extensions and improvements in power department at plant at Grafton, W. Va., including installation of fuel-saving and handling equipment, to cost about $70,000. G. Wesley Evans is superintendent.

Erie Bolt & Nut Co., Erie, Pa., will erect a one-story building, 50 x 140 ft., for machine shop and additional storage purposes. All materials and machinery have been purchased.

Cleveland

CLEVELAND, Aug. 5.—Machine tool sales held up well during July although dealers' orders declined slightly as compared with June. A local manufacturer of turret lathes reports a 20 per cent gain in business in July over the previous month, its sales lats month equaling the large volume attained in May. Business is well diversified and buying is in small lots, few orders being for more than two or three machines.

The Cleveland Union Terminals Co. has purchased a few of the machines covered by its recent list of 25 tools. The Amtorg Trading Corporation has purchased some equipment, including gear cutting machines for a tractor plant in Russia. It is at present figuring on 30 turret lathes for 1929 delivery. While deliveries of some lines of tools have improved considerably, other makers are as far behind on shipments as a few weeks ago.

Gogan Machine & Foundry Co., 1440 East Fifty-fifth Street, Cleveland, has awarded contract to J. L. Hunting Co. for an addition, 40 x 72 ft., to cost about $70,000. Company makes heat treating machines used in manufacture of springs and spring forming machinery. Joseph Gogan is president.

Medusa Portland Cement Co., Engineers' Building, Cleveland, is concluding arrangements for controlling interest in Newaygo Portland Cement Co., Newaygo, Mich., and its subsidiary, Manitowoc Portland Cement Co., Manitowoc, Wis. Consolidated interests will operate a group of eight mills with gross annual output of 8,000,000 bbl. Medusa company has plans for another mill at Charlevoi, Mich., with initial capacity of 1,500,000 bbl. annually to cost about $2,500,000 with machinery. J. B. John is president.

McKay Machine Co., Youngstown, manufacturer of metal-working and automotive machinery and parts, has awarded general contract to Emil P. Linberger, 830 Market Street, for one-story addition, to cost about $45,000 with equipment.

Suburban Light & Power Co., Alliance, Ohio, has work under way on an expansion program to cost about $500,000, of which about $350,000 will be used for an addition to local steam-operated electric generating station.

Toledo Grain & Milling Co., Toledo, Ohio, is considering rebuilding part of flour mill destroyed by fire July 28, with loss reported more than $300,000 including machinery.

E. F. Hauserman Co., 6800 Grant Avenue, Cleveland, manufacturer of steel partitions for offices, factories, etc., has plans for a one and two-story addition, to cost more than $50,000 with equipment. George S. Rider Co., Century Building, is architect and engineer.

Akron Air Services, Inc., 975 East Market Street, Akron, Ohio, has awarded general contract to Clemmer & Noah, Inc., 470 East Market Street, for hangar with shop and repair facilities at Fulton Field, to cost about $80,000 with equipment.

Lindsay Wire Weaving Co., 14025 Aspinwall Avenue, Cleveland, has plans for a two-story addition, 50 x 120 ft., to cost about $65,000 with equipment. Bohnard & Parson, Euclid Building, are architects. H. L. Lindsay is president.

Chicago

CHICAGO, Aug. 5.—Lighter demand for machine tools is noted in this district. New orders are widely scattered and individually small. Fresh inquiry, although not large, continues at a steady rate, giving some indication that August sales will be in satisfactory volume. Deliveries remain practically stationary on standard tools and buyers of special equipment are also having difficulty in obtaining deliveries promised.

Steady progress is reported on the special machinery in the International Harvester Co.'s list. It is thought that some orders will be placed next week.

Western Electric Co., Hawthorne Station, Chicago, will build a one-story addition, 95 x 204 ft. to cost $95,000. C. B. Barnes, Hawthorne Station, is architect.

Heating Systems Corporation, Joliet, Ill., has broken ground for first unit of its plant, to cost over $100,000 including equipment.

Martin-Parry Corporation, 2201 South Union Avenue, Chicago, manufacturer of commercial automobile bodies, has leased part of one-story building at 2848 Quinn Street, and will remodel for new assembling works. Present plant will be removed to new location. Headquarters and main plant are at York, Pa.

Iowa Railway & Light Co., Cedar Rapids, Iowa, has awarded a general contract to J. W. Hopp Construction Co., Granby Building, for two-story equipment storage and distributing plant with repair facilities, to cost about $35,000.

City Council, Moline, Ill., is planning establishment of municipal airport to cost about $150,000, with hangars, repair and reconditioning shops and other units. A special aviation commission has been formed to carry out project. R. M.

Benell, City Hall, is city engineer in charge.

Standard Stamping & Perforating Co., 4718 Fifth Avenue, Chicago, manufacturer of metal products, has leased site and building to be erected in Kenwood manufacturing district by Holton, Seelye & Co., 140 South Dearborn Street, to be one story, totaling about 13,000 sq. ft. floor space, to cost about $40,000. Present works will be removed to new location and additional equipment installed.

Taylor Forge & Pipe Co., West Fourteenth Street and Cicero Avenue, Cicero, Ill., has plans for one-story unit, to cost about $45,000 with equipment. Weiss & Niestedt, 53 West Jackson Boulevard, Chicago, are architects.

Traveling ovens, power equipment, conveying and other machinery will be installed in three-story plant to be erected by Cushman Sons, Inc., 1138 Bryn Mawr Avenue, Chicago, to cost $260,000. Michaelson & Rognstad, 3256 Franklin Avenue, are architects.

Faries Mfg. Co., Decatur, Ill., manufacturer of electric fixtures, is erecting a one-story addition, 80 x 240 ft.

Indiana

INDIANAPOLIS, Aug. 5.—City Council, Terre Haute, has authorized a bond issue of $125,000 for establishment of municipal airport, to include hangars, repair shops and other units. It is proposed to purchase present air terminal of Terre Haute Airways, Inc., and expand.

Anaconda Wire & Cable Co., operated by Anaconda Copper Mining Co., 25 Broadway, New York, has purchased three plants and other properties of Marion Insulated Wire & Rubber Co., Marion, manufacturer of rubber-covered wire, cables, etc., and will consolidate. Plants will be continued at present location and production increased.

Bendix Aviation Corporation, South Bend, Ind., operating Bendix Brake Co., and other properties, will take over General Instrument Co., recently organized, and operate as unit of organization. Last noted company has secured Pioneer Instrument Co., Brooklyn, N. Y.; J. P. Marsh Co., Detroit; Paulin System, Inc., Los Angeles, and Tiffany Mfg. Co., Newark, N. J., all manufacturers of aircraft and automotive instruments. Expansion is planned, including addition to plant of Pioneer company to cost about $60,000. Vincent Bendix is chairman of General Instrument Co.; Orvill W. Thompson is president.

Western Oil Co., 310 North Meridian Street, Indianapolis, has filed plans for new oil storage and distributing plant, including machine shop, at Kokomo, reported to cost about $50,000 with equipment.

Bailey Products Corporation, Union City, has been organized to take over business of Bailey Mfg. Co., local, manufacturer of screw and metal products and of couplings for magnetos, generators and water pumps. O. G. Gist is president and G. A. Thomas, manager.

Edwards Iron Works, South Bend, has work under way on an expansion program to cost $300,000. New buildings include main shop, 186 x 325 ft., in which all fabricating will be done, two warehouses, 80 x 562 ft. and 40 x 360 ft., respectively, and a power house.

Lamb Machine Co., Indianapolis, has moved to 1128 West Street, and is in operation.

Gulf States

BIRMINGHAM, Aug. 5.—Plans have been approved by Prest-O-Lite Co., 30 East Forty-second Street, New York, manufacturer of acetylene equipment, welding apparatus, etc., for branch plant at Tampa, Fla., to cost over $90,000 with machinery.

Hurricane Motor Co., Inc., 2103 Walker Street, Houston, Tex., manufacturer of aircraft motors and parts, will soon begin construction of new one-story plant, to cost more than $175,000 with machinery.

Brown Paper Mill Co., Inc., Monroe, La., is disposing of bond issue of $3,000,000, fund to be used for construction of addition to mill for production of kraft papers and kraft paperboard. Work is scheduled for completion in 12 months and will cost about $1,500,000 more than bond issue. George F. Hardy, 309 Broadway, New York, is consulting engineer.

Central Power & Light Co., Frost National Bank Building, San Antonio, Tex., has acquired site at Mercedes, Tex., for a new ice-manufacturing plant, to cost about $175,000 with machinery. Company also plans erection of similar plant at Elsa, Tex., to cost about $85,000.

Gulf Refining Co., Gulf Building, Houston, Tex., has begun construction of oil storage and distributing plant, to consist of five main buildings, pumping station, tanks, 300-ft. dock and other structures, to cost more than $350,000 with equipment. Headquarters are in Frick Annex, Pittsburgh.

Galveston Wharf Co., Galveston, Tex., will issue bonds for $2,245,000, fund to be used for addition to grain elevator, to include elevating, conveying, screening and other equipment for capacity of 5,846,000 bu.

City Council, Abilene, Tex., has plans for hangar, 100 x 100 ft., with shop and mechanical facilities at municipal airport, to cost about $55,000 including equipment. B. Russell Shaw, Arcade Building, St. Louis, is architect.

Charles A. Seward Machine Co., Birmingham, manufacturer of elevating, conveying and kindred machinery, is carrying out an expansion program in transmission equipment division.

Southern Natural Gas Corporation, Monroe, La., has work under way on new pipe line from Monroe and Richland, La., gas fields to Atlanta, Ga., total distance of 421 miles, to furnish natural gas for industries at different points in Georgia. It is scheduled for completion in January, and will cost $20,000,000 with compressor stations and other facilities.

Texas-Louisiana Power Co., Fort Worth, Tex., will build new steam-operated electric power plant at Perryton, Tex., to cost about $80,000 with equipment.

Dallas Airports Utilities Corporation, Dallas, Tex., recently organized, has plans for hangar, 150 x 330 ft., with repair and reconditioning shops, at Love Field, to cost about $75,000 with equipment. Edgar L. Flippen is president.

Board of Education, Lubbock, Tex., is considering installation of manual training department in new three-story high school to cost $600,000, for which plans are being completed by Peters, Strange & Bradshaw, Lubbock, architects.

Yellow Cab Co., Dolorosa Avenue, San Antonio, Tex., has awarded general contract to Allen & Allen, Fredericksburg Road, for one-story service, repair and garage building, 145 x 160 ft., to cost about $100,000 with equipment.

St. Louis

ST. LOUIS, Aug. 5.—Bids are being asked on general contract by Mack International Motor Truck Corporation, 2804 Pine Street, St. Louis, for one-story factory branch, with assembling department, to cost $230,000 with equipment. H. E. Foster, 400 West Madison Street, Chicago, is architect and engineer. Headquarters of company are at 25 Broadway, New York.

City Council, Lees Summit, Mo., has plans for municipal electric light and power house, to cost about $100,000 with machinery. Rollins Engineering Co., Railway Exchange Building, Kansas City, Mo., is engineer.

Board of Education, Topeka, Kan., will install a manual training department in addition to Roosevelt Junior High School, for which plans have been completed by Thomas W. Williamson & Co., Farmers' National Bank Building, architects.

City Council, Little Rock, Ark., has called special election on Aug. 19 to approve bond issue of $200,000 for establishment of municipal airport, including hangars, repair shops, oil storage and other units, for which plans will be drawn at once.

Greenlease-Moore Chevrolet Co., 901 North Broadway, Oklahoma City, Okla., representative for Chevrolet automobile, has awarded general contract to William Lambert Construction Co., 1812 West Sixteenth Street, for service, repair and sales building, to cost about $100,000 with equipment. N. B. Fleming, Commercial Building, is architect.

Air Terminal Corporation, Kansas City, Mo., care of Buckley & Van Brunt, Gloyd Building, architects, has plans for airport terminal at municipal field, including one, two and three-story hangar of circular type, 450 ft. diameter, with repair shops and other divisions, to cost $500,000 with equipment.

Board of Education, Concordia, Kan., is considering installation of manual training equipment in new junior and senior high school to cost about $300,000, for which bids are being asked on general contract until Aug. 20. Proudfoot, Rawson, Souer & Thomas, Hubbell Building, are architects.

Oklahoma Pipe Line Co., Oklahoma City, Okla., a subsidiary of Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, is planning construction of pipe line from Cushing, Okla., to point near Oklahoma City, about 53 miles, to cost more than $300,000 with booster stations, etc.

Capitol City Steel & Iron Co., Oklahoma City, Okla., has work in progress on a new structural steel fabricating mill, to cost more than $100,000.

Western Automobile Co., Washington Boulevard and Euclid Avenue, St. Louis, has awarded general contract to Shasserre Construction Co., Fullerton Building, for three-story service, repair and sales building, to cost about $100,000 with equipment.

Pacific Coast

SAN FRANCISCO, Aug. 1.—Contract has been let by Paramount Famous-Lasky Corporation, Hollywood, Cal., to Union Engineering Co., Huntington Park, Cal., for a one-story machine shop to cost about $40,000 with equipment.

Standard Rock Co., Builders' Building, Stockton, Cal., is planning installation of rock-crushing plant with conveying, load-

ing and other equipment, to cost over $100,000. A stock issue of about $200,000 will be sold, part of fund to be used for new plant.

Department of Works, San Francisco, has plans for a hydroelectric power plant in connection with Hetch Hetchy water project, at Red Mountain bar, Don Pedro dam of Modesto Valley Water District. Station will be equipped for initial capacity of 25,000 kw., and is reported to cost about $1,000,000 with transmission lines and switching stations. City engineering department, Nelson Eckert, assistant city engineer, in charge.

Calumet & Arizona Mining Co., Douglas, Ariz., has authorized an expansion program at local smelting plant and at mining properties in Bisbee district. At last noted place all mining and surface equipment will be electrified, and new hoists and other machinery installed. Project will cost $2,100,000. Headquarters of company are at Calumet, Mich.

Clinton Campbell, Phoenix, Ariz., operating two local brick manufacturing plants, has plans for a third plant to cost about $125,000 with machinery.

Willard Storage Battery Co., East 131st. Street and St. Clair Avenue, Cleveland, manufacturer of electric storage batteries, has purchased property in the Union Pacific industrial district, Los Angeles, 300 x 600 ft., for new plant for Western coast trade. Plans are under way for two initial units, each one story, to cost about $350,000 and $250,000 with equipment, respectively. Other structures will be built later. Entire project will cost about $1,000,000.

Breese Aircraft Corporation, Portland, Ore., recently organized, will take over company of same name with local plant, specializing in production of monoplanes. Plans are under way for general expansion, including establishment of new parts manufacturing and assembling plant near municipal airport on Swan Island where production will be concentrated. New company has arranged for stock issue to total $620,000, large part of proceeds to be used for development noted.

Mountain States Power Co., Tacoma, Wash., has plans for extensions in steam-operated electric power plant on Coos Bay, Marshfield, Ore., to include installation of additional equipment. Extensions will be made in transmission lines in district noted. Entire project will cost over $1,000,000.

Crown-Willamette Paper Co., 248 Battery Street, San Francisco, is beginning work on extensions at mill at Camas, Wash., to include installation of machinery in pulp department and paper-making division, to cost over $3,500,000.

Kreager Heater Corporation, 1821 East Olive Way, Seattle, Wash., is in market for motors, thermostats, transformers and blowers. H. W. Leavitt is vice-president and secretary.

Jacobs & Gile, Portland, Ore., steel jobbers, have let contract to Austin Co., for a warehouse to cost $30,000.

Washing Machine Service Co., 918 West Seventh Place, Los Angeles, manufacturer of parts and accessories for washing machines, has recently been incorporated. William Vogel is president and general manager.

Canada

TORONTO, Aug. 5.—Machine tool sales in July tapered somewhat, compared with previous months this year, but business, as a whole, was better than that of the corresponding month last year. The total volume for the first seven months of this year was well above that of other years since the war. Current demand, while not strong, is holding at a satisfactory summer level. Inquiries are good, and there are indications of some fair sized lists to be issued soon.

Toronto Hydroelectric Commission, Yonge Street, has approved purchase of equipment to cost $1,000,000.

Bell Furniture Co., Southampton, Ont., has started work on the foundations for a $25,000 factory addition, three stories, 60 x 80 ft.

A. G. Spalding & Brothers, of Canada, Ltd., 5 Edward Street, Brantford, Ont., manufacturer of sporting goods, etc., has awarded contract to Schultz Construction Co., 45 Albion Street, for a one-story factory addition, to cost $40,000.

Steel Co. of Canada, Ltd., 525 Dominion Street, Montreal, head office, Hamilton, Ont., has awarded a number of contracts for erection of an addition. Mander & Lucas, 2072 Aulmer Street, have the general contract.

Several contracts have been awarded for plant at Niagara Falls, Ont., for Lionite Abrasive, Ltd., Niagara Falls, N. Y., to cost $150,000.

Canadian Office & School Furniture Co., 1195 King Street, Preston, Ont., has started work on one-story addition, 70 x 93 ft., to cost $40,000.

Foreign

OFFICIALS of Grigsby-Grunow Co., 2038 North Kolmar Avenue, Chicago, manufacturer of radio sets and equipment, have organized Grigsby-Grunow Co., Ltd., to operate in England. Plans are being arranged for construction of a plant near London, to cost more than $350,000 with machinery. B. J. Grigsby is president of parent company.

Russo-Asiatic Consolidated Co., Sydney, Australia, has acquired a controlling interest in Mount Isa Mines Co., in North Queensland section, and is arranging for development of lead and zinc properties. New owner will continue construction program now under way, to include erection of mill and smelter, power plant, mines equipment buildings and other units, to cost over $6,000,000 with machinery.

Spencer Kellogg & Sons, Inc., Niagara Square, Buffalo, manufacturer of linseed and other refined oils, has purchased plant and properties of L. C. Gillespie & Sons, Hankow, China, producers and refiners of chinawood oil. New owner will take over property at once and plans expansion.

American & Foreign Power Co., operated by Electric Bond & Share Co., 2 Rector Street, New York, has purchased property at Mezquital, near Durango, Mexico, and is reported planning a new hydroelectric generating plant, with transmission lines to connect with Durango system and within radius of about 150 miles of that city for power supply to mining properties in district. Entire project will cost about $3,500,000.

Government of Panama, Panama, is arranging fund of about $70,000 under direction of Government Road Board, for extensions and improvements in municipal airport, known as Paitilla Field, to include hangars, repair shops, oil storage and other field units.

Ford Motor Co., Detroit, is said to be planning construction of new assembling plant at Antivaria, Jugoslavia, to cost more than $750,000 with equipment. This will be one of number of plants to be established in Europe including works in Russia and in Germany, each to represent investments of more than $5,000,000.

New Trade Publications

Oxwelding Aluminum and Its Alloys.—Linde Air Products Co., 30 East Forty-second Street, New York. Eight-page pamphlet describing required technique, illustrating many desirable fixtures, and equipment welded of commercial aluminum.

Acid Proof Mastic.—Nukem Products Corporation, Buffalo, N. Y. Folder describing "Basolit," an acid proof material for flowing between joints in brick-lined pickling tanks, and methods of constructing leak-proof tanks.

Arc Welders and Supplies.—General Electric Co., Schenectady, N. Y. Pamphlets GEA-876C, GEA-1009A, and GEA-571C, describing respectively 400-ampere welder driven by alternating current motor, 300-ampere portable welder driven by gas engine, and equipment such as shields, electrode and holders, resistors and reactors.

Welding Wire.—Page Steel & Wire Co., Bridgeport, Conn. Folder entitled "Materials Are Important," but argues proposition that special processing of materials going into wire is necessary to make good wire for welding.

Welding and Cutting Outfits.—International Oxygen Co., Newark, N. J. Folder illustrating outfits designed especially for general automobile work in repair garages.

Nickel in Cast Iron.—International Nickel Co., Inc., 67 Wall Street, New York. Bulletins 201-A and 207 describing methods of making alloy cast iron, and the properties of nickel and nickel-chromium cast irons fitting them for gas and steam engine cylinders, parts to resist pressure, machine tool beds and tables, and intricate castings generally.

Mine and Industrial Locomotives.—Baldwin Locomotive Works, Philadelphia, and Westinghouse Electric & Mfg. Co., East Pittsburgh. Special publication No. 1841, devoted to electric locomotives manufactured in conjunction by the two companies. Illustrations, plans and complete data on locomotives recently placed in service by companies are included with special reference to the transportation problems of small companies.

Pipe Fittings.—Westinghouse Electric & Mfg. Co., East Pittsburgh. Circular 1676-B dealing with fittings for pipe structures with many illustrations. Many new applications for pipe fittings are included, such as racks in industrial establishments, railings, display racks and pipes of all kinds.

Sprayers.—Binks Mfg. Co., Chicago. Bulletin No. 12 describes the use of hand and power sprayers for cold water paints, whitewash, calsomines and insecticides.

Water Wheels.—James Leffel & Co., Springfield, Ohio. A detailed description of a Leffel water wheel, featuring the Leffel outside or exposed type gate operating mechanism, is contained in Bulletin W205.